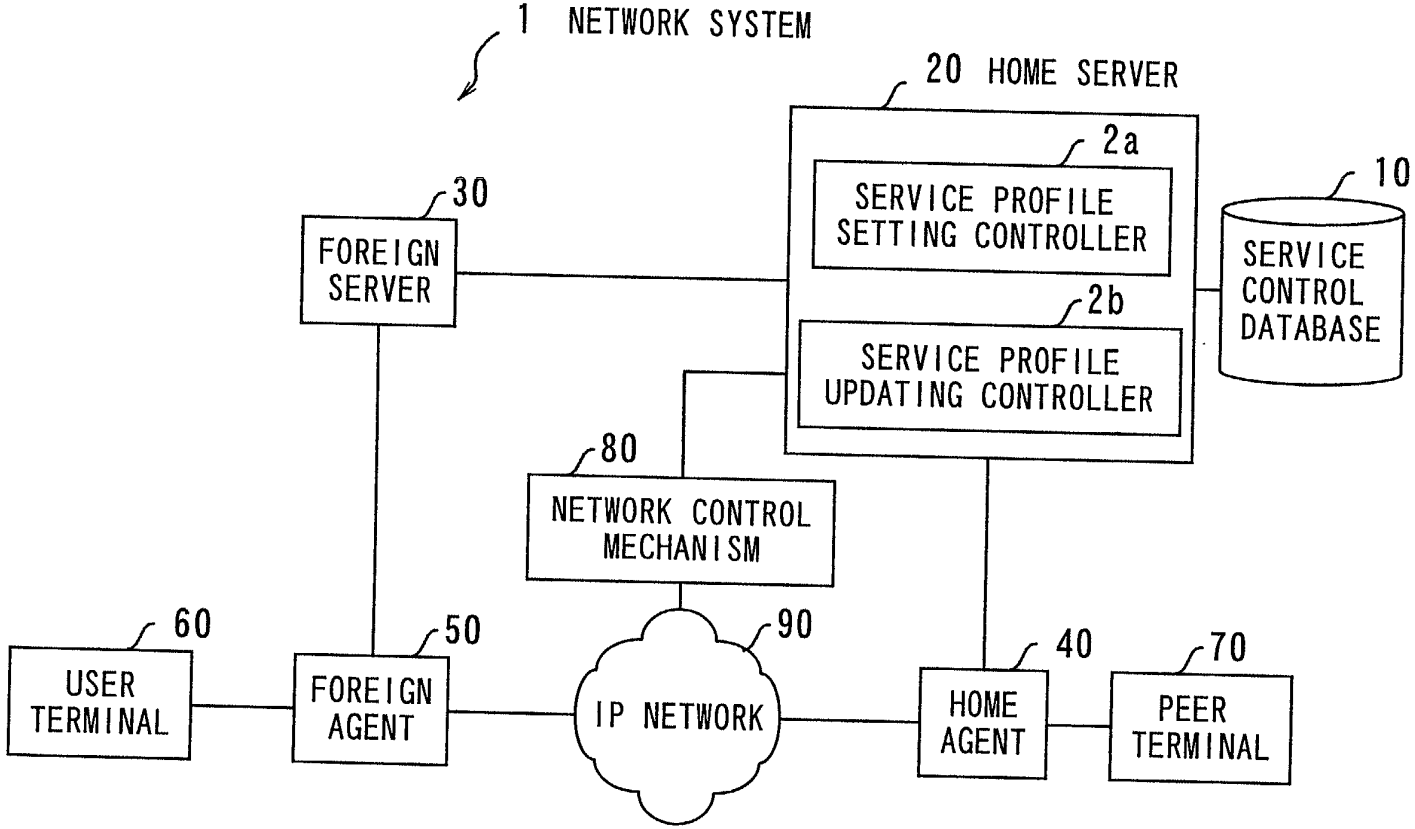

FIG. 1

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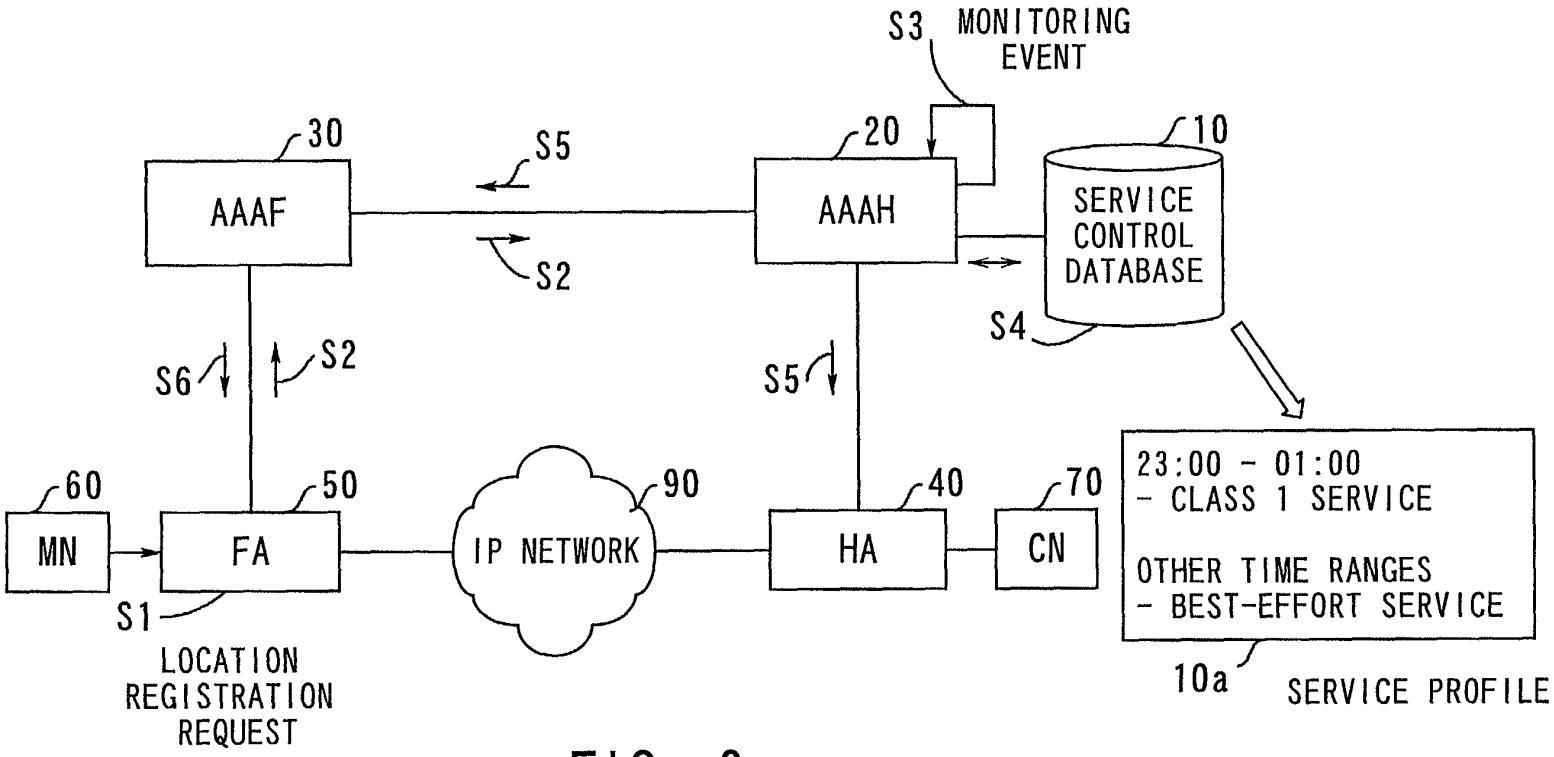

FIG. 2

09759183.011201

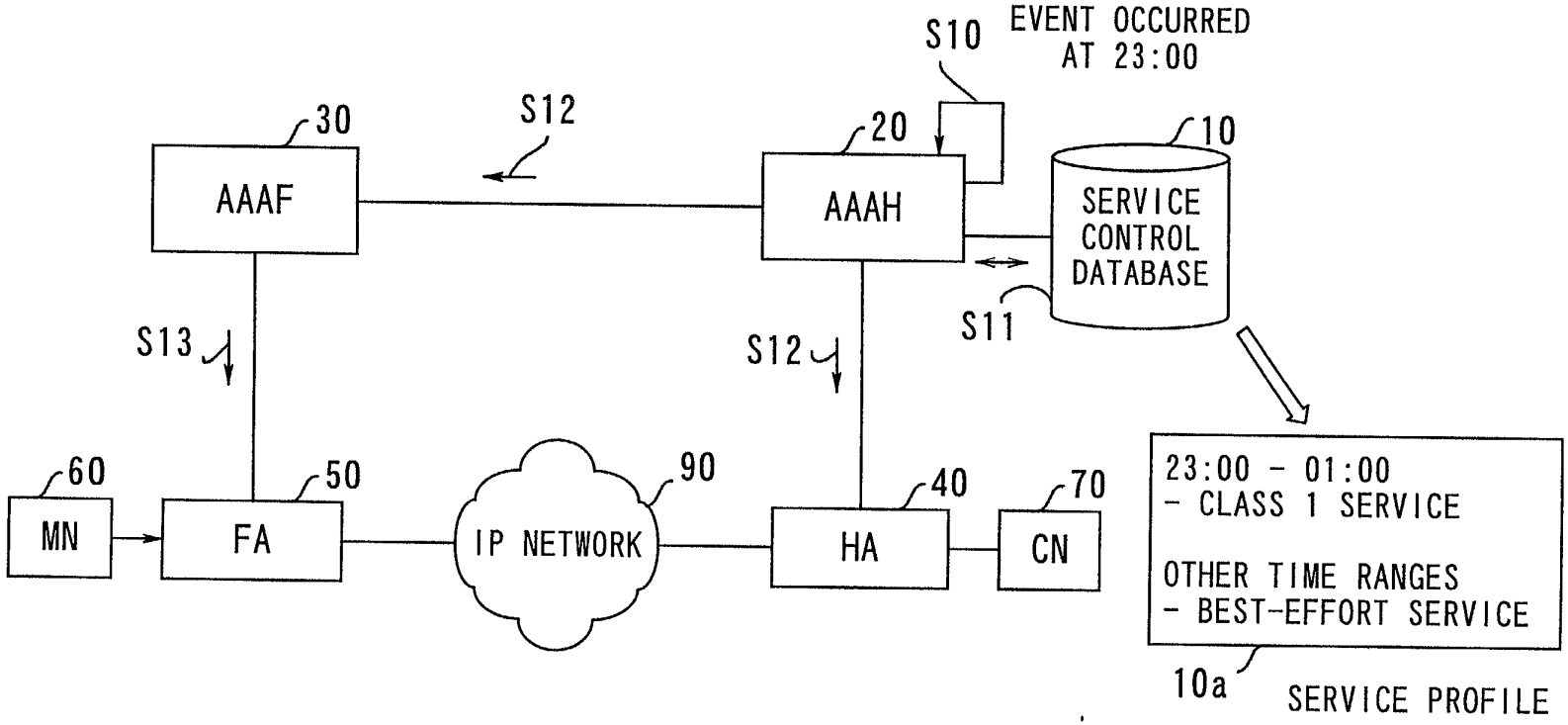

FIG. 3

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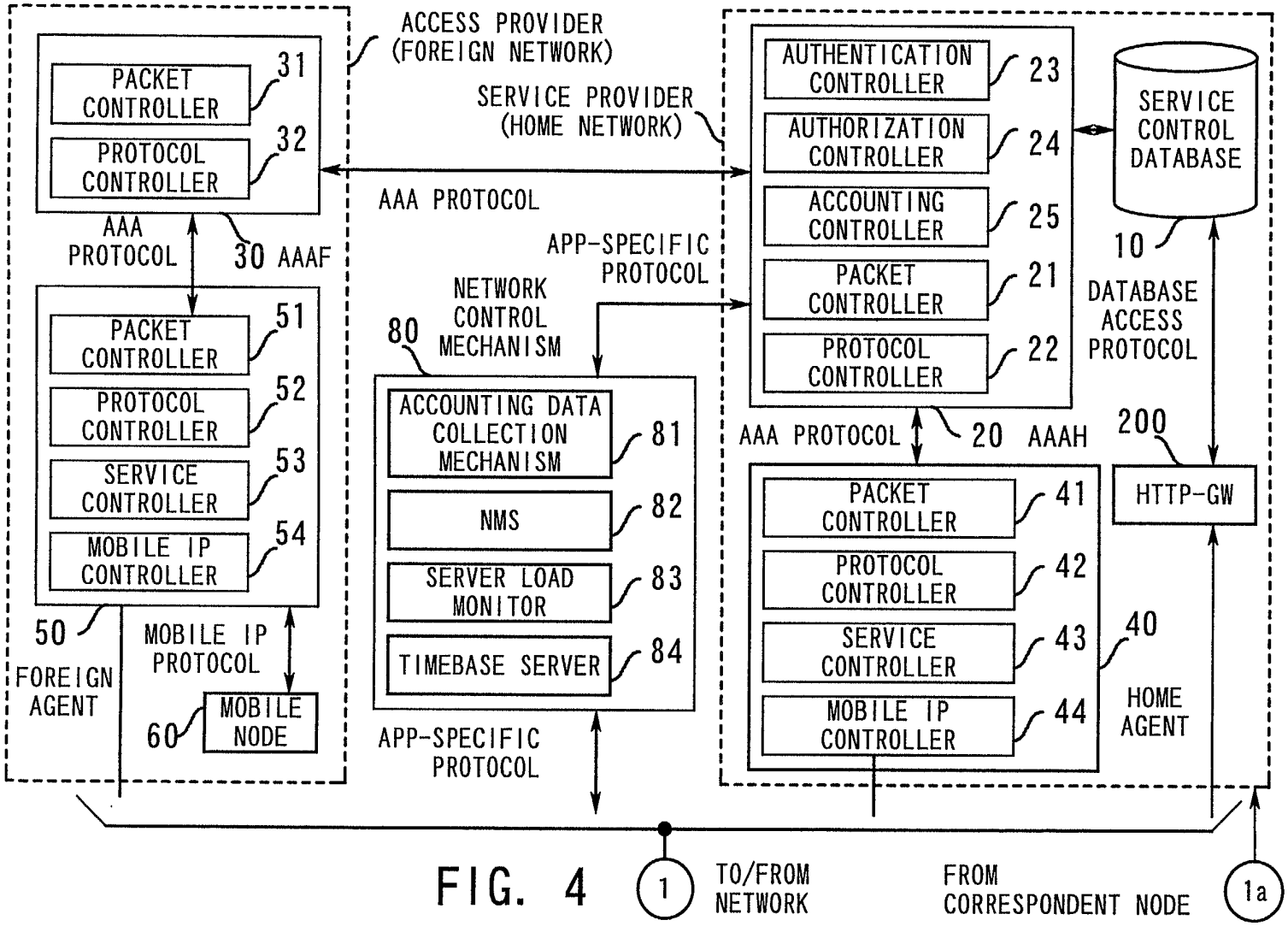

FIG. 4

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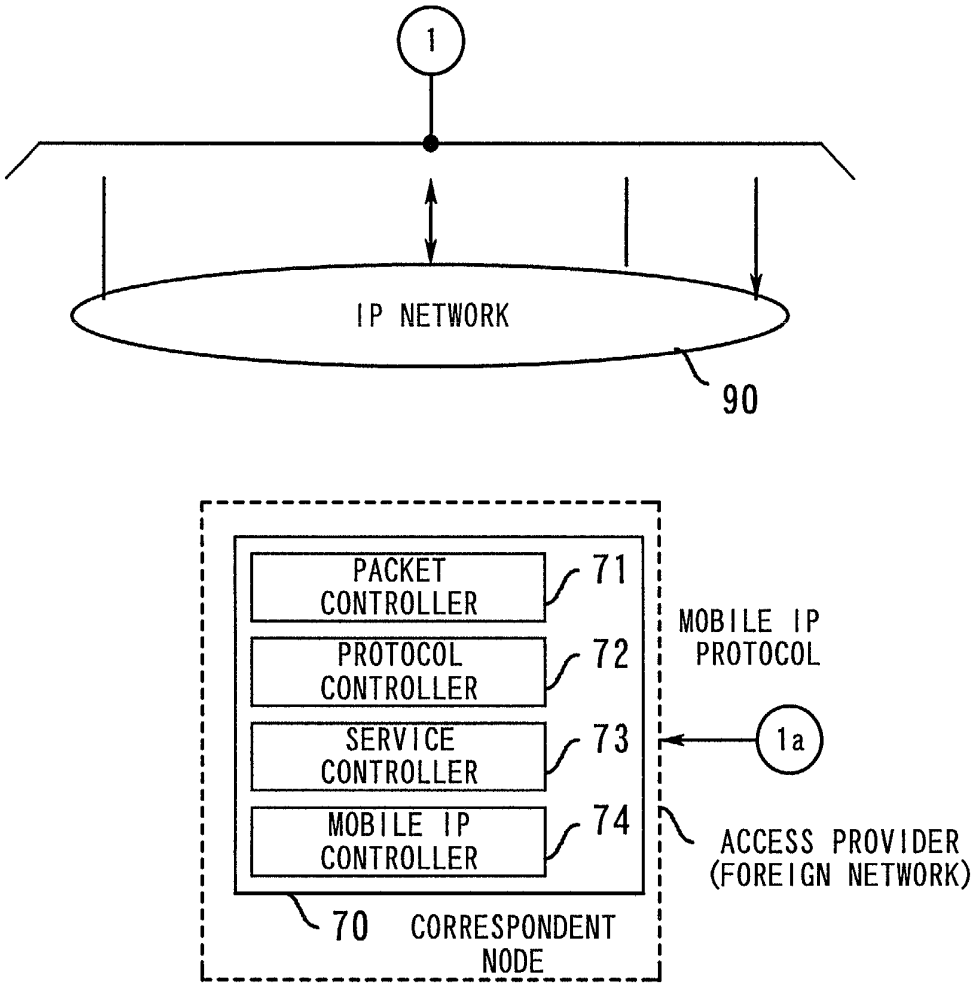

FIG. 5

09759183_011201

	Data Items	Detailed Data Items	Description
10-1	Profile Identifier	Session Identifier	Indicate session type
		Profile Number	Uniquely assigned to each session
10-2	Packet Extraction Parameters	Source Address	Packet filtering rules
		Source Port No.	
		Destination Address	
		Destination Port No.	
10-3	Routine/ Packet Editing Parameters	Encapsulation (Encryption) Method	How to encapsulate packets to be routed
		Routing Address (Multiple Entries Allowed)	IP address of the next node
		Type of Service (TOS)	TOS field value to be set to IP header
		Decapsulation Command	Request for decapsulation
10-4	Individual Control Data	Service Control Type	Designate which control table to search – service profile cache – binding cache – MIP home (mobility binding) – MIP foreign (visitor list) – ANYCAST (extended visitor list) – routing table
		Control Data Identifier	Pointer to an intended part of the table

FIG. 6

09759183.011201

501

Service Profile Cache			Description
SPC	Node-specific SPC (NSPC)	Source SPC (NSPCsrc)	A collection of service profiles to be used mainly for user-independent, common services. Indexed by source address information of data packets. Created by a mobility agent at the time of initial set-up, based on static information stored in hard drives and other storage devices of network equipment.
		Source Default SP (NDSPsrc)	Service profile applied when there is a hit in NSPCsrc, but no hit in individual control tables.
		Destination SPC (NSPCdst)	A collection of service profiles to be used mainly for user-independent, common services. Indexed by destination address information of data packets. Created by a mobility agent at the time of initial set-up, based on static information stored in hard drives and other storage devices of network equipment.
		Destination Default SP (NDSPdst)	Service profile applied when there is a hit in NSPCdst, but no hit in individual control tables.
		Default SP (NDSP)	Default service profile used when no hit is found. For retrieval of a network device-specific control table (routing table).
	AAA Communication (ASPC)	Source SPC (ASPCsrc)	A collection of user-specific service profiles. Indexed by source address information of data packets that are sent from AAA systems when a mobile node logs in to the network.
		Destination SPC (ASPCdst)	A collection of user-specific service profiles. Indexed by destination address information of data packets that are sent from AAA systems when a mobile node logs in to the network.

FIG. 7

09759183_011201

502

Search Order	Cache Class	Cache Search Result	Individual Control Data Search Result	Next Action
1	ASPCsrc	Hit	Hit	Normal end
			No Hit	Abnormal end
		No Hit		Search NSPCsrc
2	NSPCsrc	Hit	Hit	Normal end
			No Hit	Search NDSPsrc
		No Hit		Search ASPCdst
3	ASPCdst	Hit	Hit	Normal end
			No Hit	Abnormal end
		No Hit		Search NSPCdst
4	NSPCdst	Hit	Hit	Normal end
			No Hit	Search NDSPdst
		No Hit		Use NDSP
5	NDSP	Hit	Hit	Normal end
			No Hit	Abnormal end

FIG. 8

511

Item	Description
Session ID	<NAI of Mobile Node><32-bit Value><Optional Value>
Session Timer	Remaining lifetime of this transaction

FIG. 9

512

Item	Description
Session ID	<NAI of Mobile Node><32-bit Value><Optional Value>
AAAH Address	IP address of AAAH identified by mobile node NAI
Home Agent Address	IP address of home agent allocated by AAAF
Previous Foreign Agent NAI	NAI of previous foreign agent to which the mobile node was attached
Current Foreign Agent NAI	NAI of foreign agent to which the mobile node is currently attached
SCR Requester Address	IP address of AAAH that is requesting SCR
Security Information	Authentication data for validate association between this AAAF and other entities (FA, AAAH, HA allocated by AAAH)
Session Timer	Remaining lifetime of this transaction
Foreign Agent Service Profile	See FIG. 3
Home Agent Service Profile	See FIG. 3
Current State	Waiting, HA requested, AMA in process, HA Change Requested, FA Change Requested

FIG. 10

513

Item	Description
Session ID	<NAI of Mobile Node><32-bit Value><Optional Value>
Home Agent Address	IP address of home agent allocated by AAAH
HA-managing AAAF Address	IP address of AAAF that is allowed by AAAH to allocate home agent
Current AAAF Address	IP address of AAAF requesting AMR
Previous AAAF Address	IP address of previously used AAAF
Address Proxy Address	IP address of address proxy in ANYCAST service
Security Information	Authentication data for validate association between this AAAH and other entities (HA, AAAF)
Session Timer	Remaining lifetime of this transaction
Address Proxy Server Address	IP address of address proxy server
Foreign Agent Service Profile	See FIG. 3
Home Agent Service Profile	See FIG. 3
Current State	Waiting, HA Requested, AMA in Process, HA Change Requested, FA Change Requested

FIG. 11

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514

Item	Description
Session ID	<NAI of Mobile Node><32-bit Value><Optional Value>
Session Timer	Remaining lifetime of this transaction
Mobility Binding	Pointer to mobility binding
SCR Request Flag	Flag indicating that service profile is being updated in correspondent node
SCR Requester Address	IP address of the entity requesting SCR

FIG. 12

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520

Item	Description
IP Source Address (Home Address)	Home address assigned to mobile node. Notified by registration request or AMA message
Link Layer Source Address of Mobile Node	Link layer (MAC) address of mobile node
UDP Source Port	UDP Source port of mobile node
Home Agent Address	Address of home agent. Provided in registration request or AMA message
Registration Request Identifier	Identifier used to associate between request and response
Lifetime	Valid period of registration request
Authentication Data	Authentication data used by foreign agent to authenticate requesting mobile node

FIG. 13

521

Item	Description
Home Address	Home address assigned to mobile node
Care-of Address of Mobile Node	IP address of foreign agent to which mobile node is currently attached
Correspondent Node with Route Optimization	IP address of correspondent node to which route optimization is being applied
Registration Request Identifier	Identifier used to associate between request and response
Lifetime	Valid Period of Registration Request
Authentication Data	Authentication data used by foreign agent to authenticate requesting mobile node

FIG. 14

Item	Description
User NAI	User's Network Access Identifier (NAI)
User Profile	User name, Address, Phone No. etc.
User Authentication Data	Mobile Node-AAA Authentication Key, SPI, User ID, Password
Service Level Agreement (SLA)	Service agreement with customer
Service-specific Profile	Diffserve, Packet Filtering, ANYCAST, Multi Cast, etc

FIG. 15

09759183_011201

531

Service Class	Description
Class A	Maximum transmission delay is guaranteed to be within a prescribed tolerance
Class B	In Diffserv, high priority queuing is applied as long as it does not affect Class A traffic. May be divided into several subclasses, depending on Diffserv types
Class C	Best-effort service. Lower priority queuing than Class B.

FIG. 16

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532

Item	Description
Flat-rate Accounting (Fixed charge for limited hours, plus additional charge for excess hours)	(Service Class-dependent Basic Charge) + (Service Class-dependent Hourly Rate) * (Excess Hours)
Usage-based Accounting (Proportional to the amount of packets transferred)	Summation of [(Servic Class-dependent Rate) * (Total Amount of Packets Transferred to/from Edge Node (Foreign Agent))]

FIG. 17

533

Control Parameters	Description
Charge	System warns the user when the amount of service charges has exceeded a limit predefined by the user, prompting him/her to decide whether to continue the service.
Time	User may choose a more affordable service which is available only in low-traffic hours. User may choose variable-class service which provides different levels of service depending on the time of day.
Service Class	User may choose variable-class service which provides different levels of service depending on the type of applications, or type of packets, to minimize the usage-based charge.
Roaming Option	User may enable roaming option with additional cost. User may cut the cost by disabling roaming option.

FIG. 18

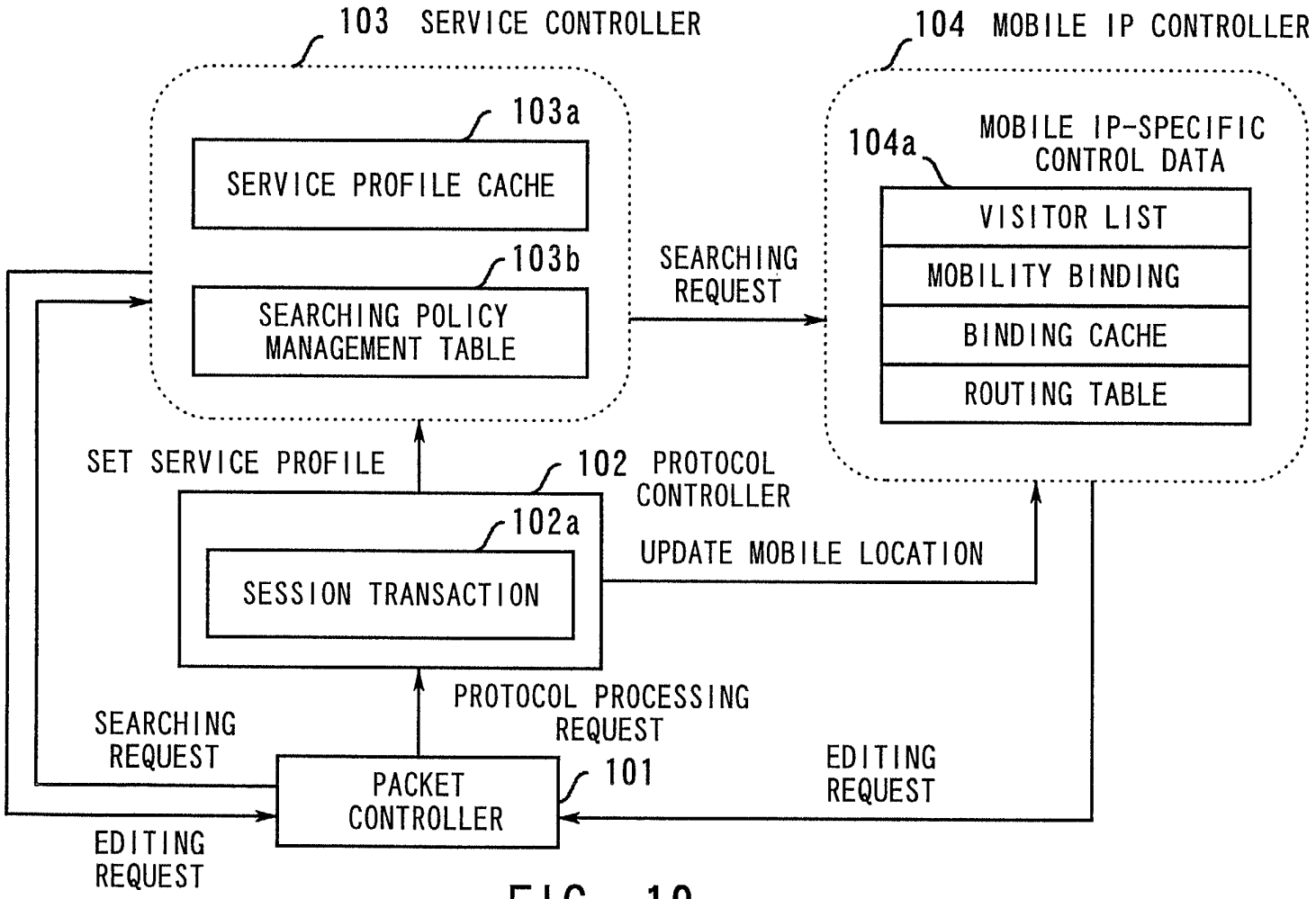

FIG. 19

09759183.011201

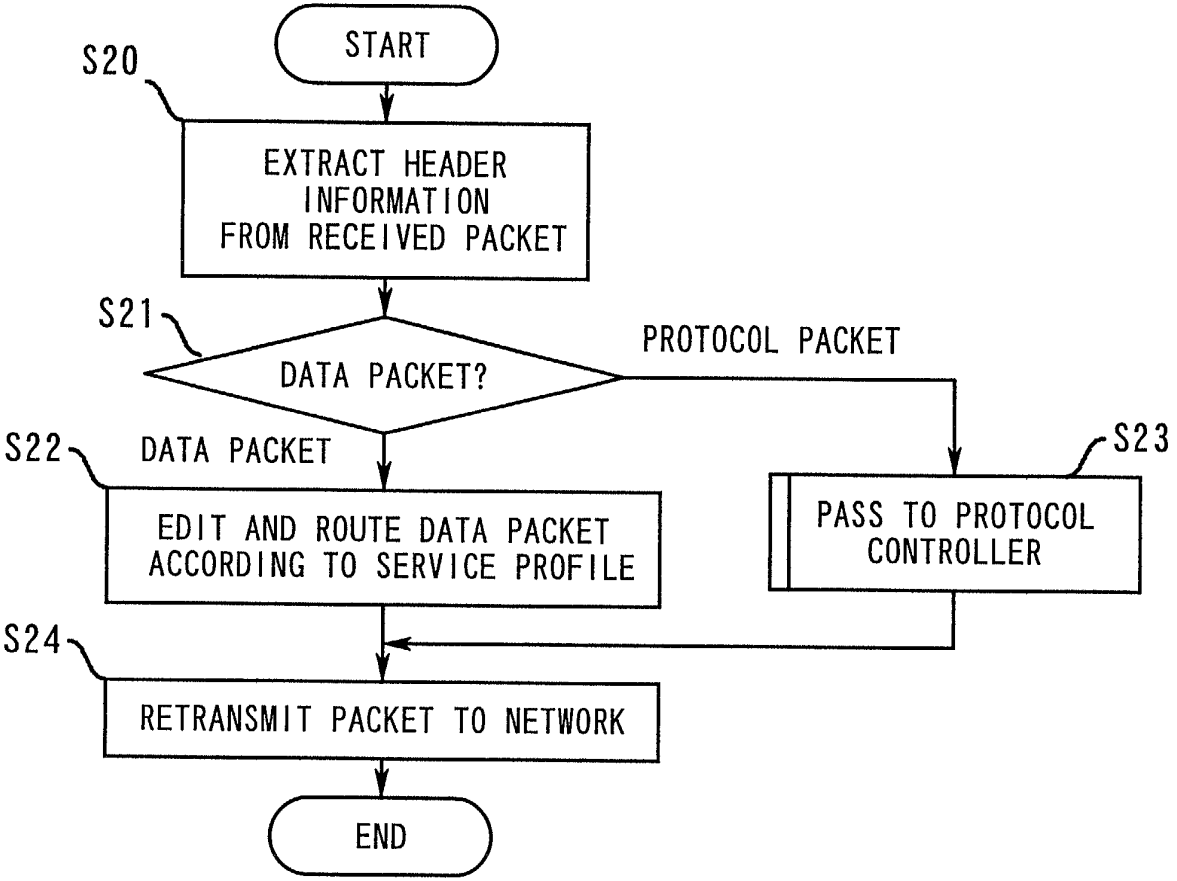

FIG. 20

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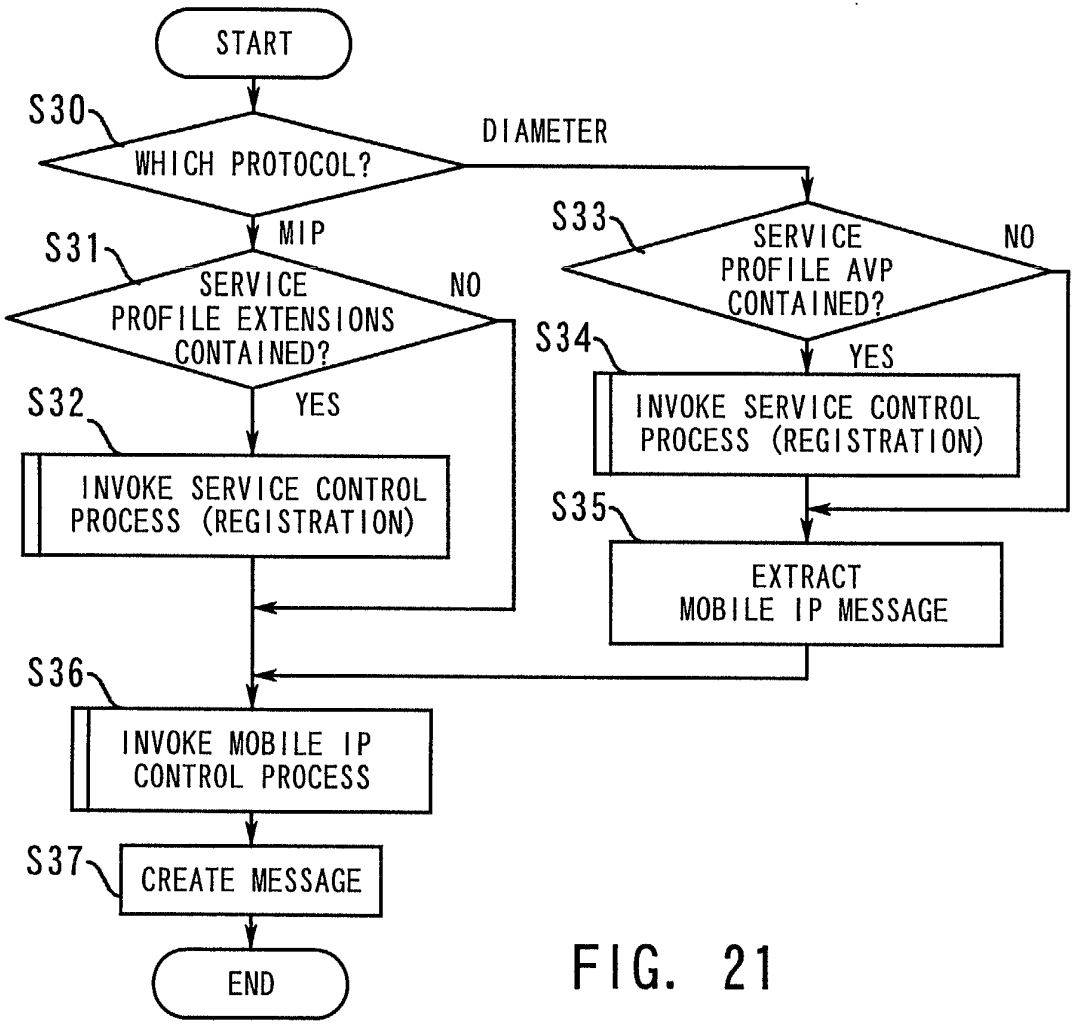
START
S30
WHICH PROTOCOL?
DIAMETER
MIP
S31
SERVICE PROFILE EXTENSIONS CONTAINED?
NO
YES
S32
INVOKE SERVICE CONTROL PROCESS (REGISTRATION)
S33
SERVICE PROFILE AVP CONTAINED?
NO
YES
S34
INVOKE SERVICE CONTROL PROCESS (REGISTRATION)
S35
EXTRACT MOBILE IP MESSAGE
S36
INVOKE MOBILE IP CONTROL PROCESS
S37
CREATE MESSAGE
END

FIG. 21

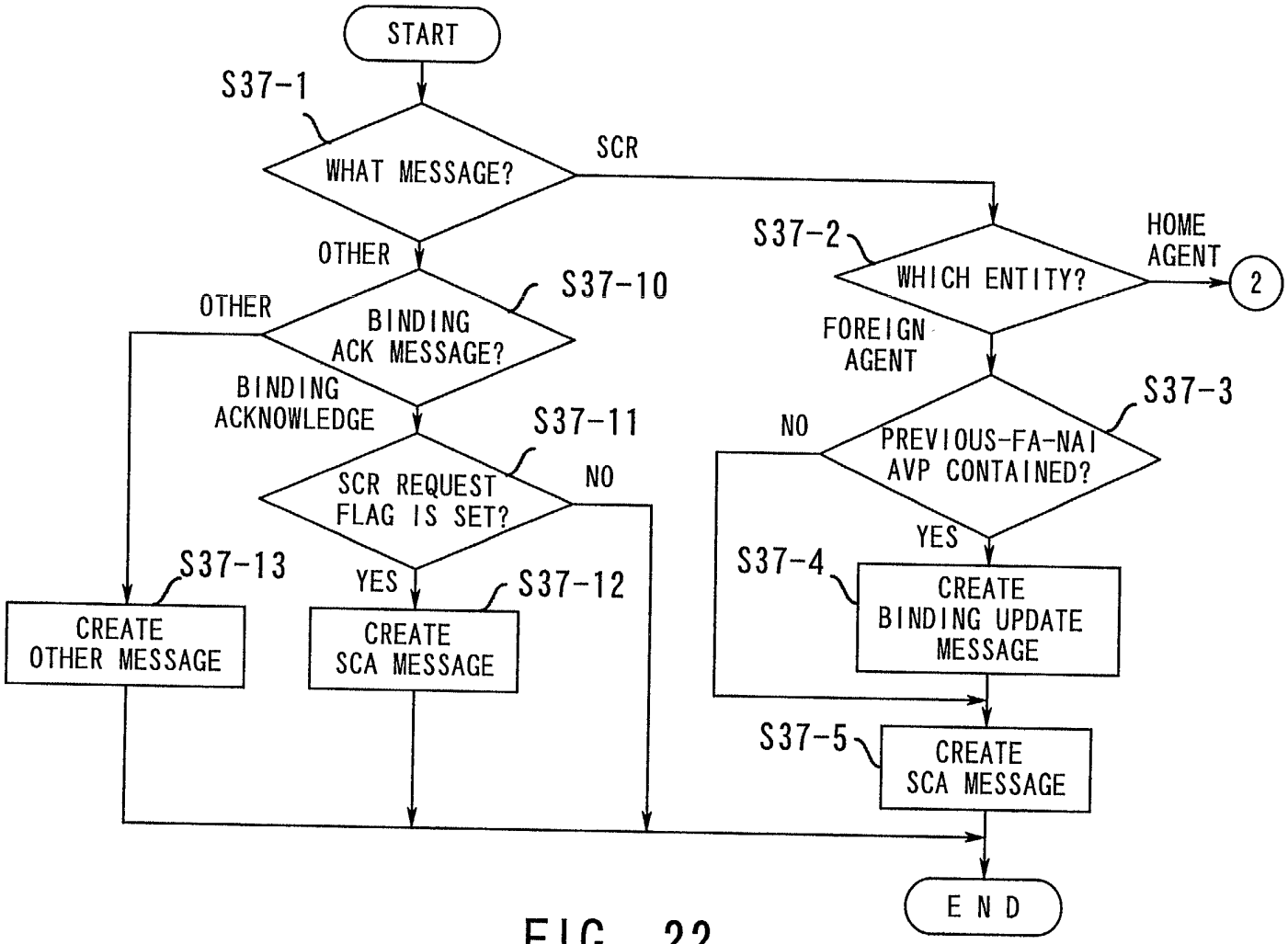

FIG. 22

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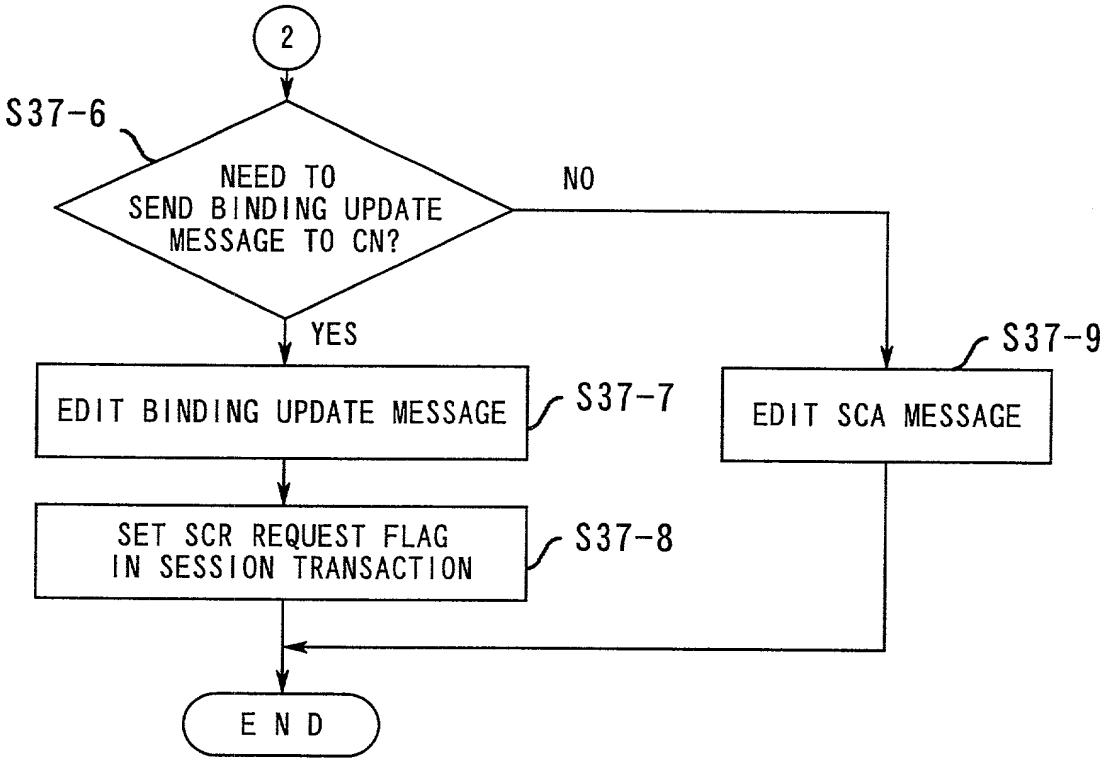
2
S37-6
NEED TO SEND BINDING UPDATE MESSAGE TO CN?
NO
YES
S37-9
EDIT BINDING UPDATE MESSAGE
S37-7
EDIT SCA MESSAGE
SET SCR REQUEST FLAG IN SESSION TRANSACTION
S37-8
END

FIG. 23

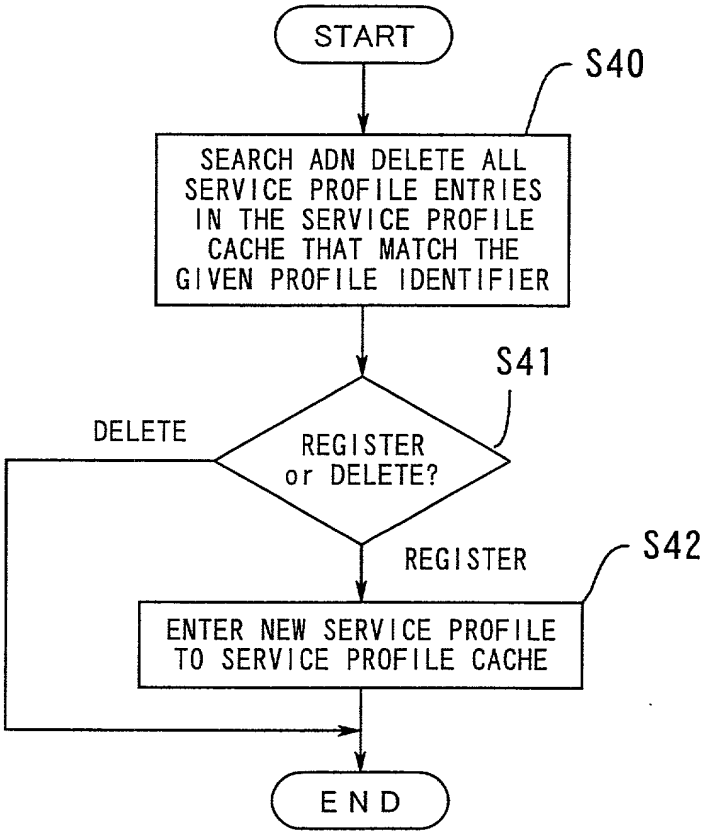
START
S40
SEARCH ADN DELETE ALL SERVICE PROFILE ENTRIES IN THE SERVICE PROFILE CACHE THAT MATCH THE GIVEN PROFILE IDENTIFIER
S41
DELETE
REGISTER or DELETE?
REGISTER
S42
ENTER NEW SERVICE PROFILE TO SERVICE PROFILE CACHE
END

FIG. 24

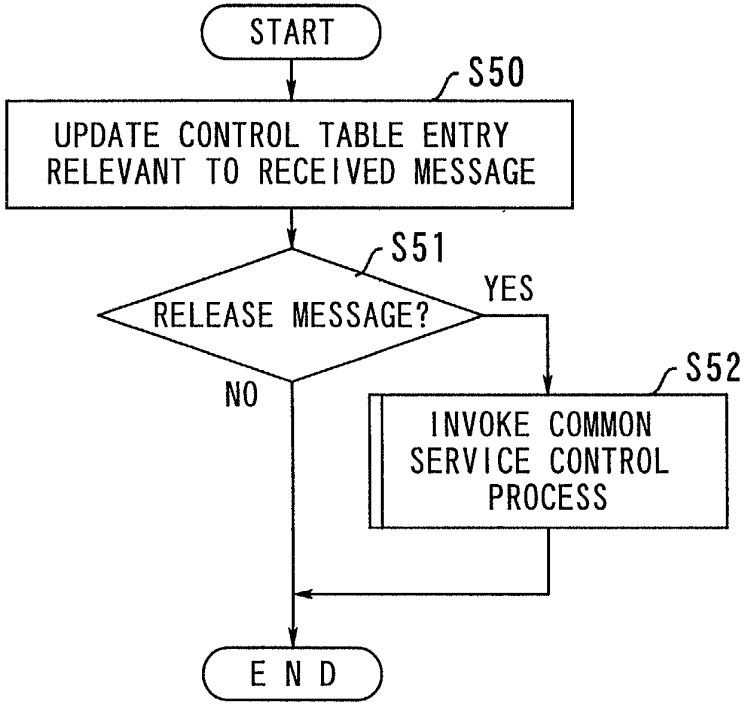

FIG. 25(A)

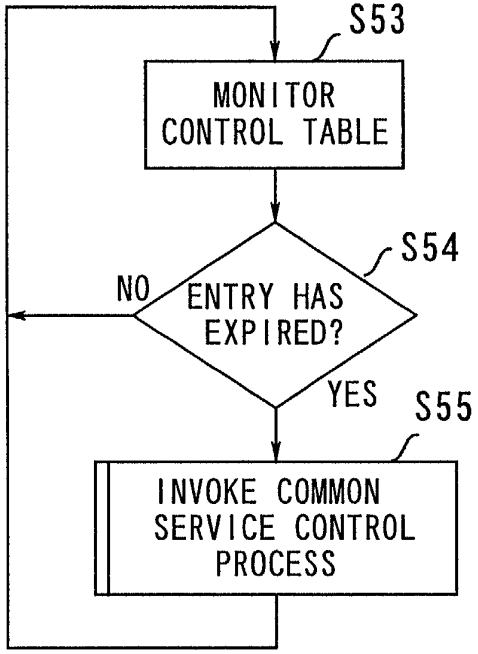

FIG. 25(B)

09759183_011201

600

Received Message	Criteria	Precessing Entity	Message to be transmitted	Protocol
Registration Request	with AAA extension	Foreign Agent	AMR	DIAMETER
Registration Request	without AAA extension	Foreign Agent	Registration Request	Mobile IP
		Home Agent	Registration Reply	Mobile IP
Registration Response		Foreign Agent	Registration Reply	Mobile IP
AMA		Foreign Agent	Registration Reply	Mobile IP
HAR		Home Agent	HAA	DIAMETER
Binding Update		Foreign Agent, Correspondent Node	Binding Acknowledge	Mobile IP
Binding Acknowledge	SCR is present	Home Agent	SCA	DIAMETER
SFR		Foreign Agent, Home Agent	SFA	DIAMETER
SCR	with Previous-FA-NAI AVP	Foreign Agent	Binding Update, SCA	Mobile IP, DIAMETER
	without Previous-FA-NAI AVP	Foreign Agent	SCA	DIAMETER
	Binding Update for CN required	Home Agent	Binding Update	Mobile IP
	No Binding Update for CN required	Home Agent	SCA	DIAMETER

FIG. 26

09759183 .011201

610

Processing Entity	Received Message	Control Table
Foreign Agent	Registration Request Message	Visitor List
	Binding Update Message	Binding Cache
Home Agent	Registration Request Message	Mobility Binding
Correspondent Node	Binding Update Message	Binding Cache

FIG. 27

09759183 .011201

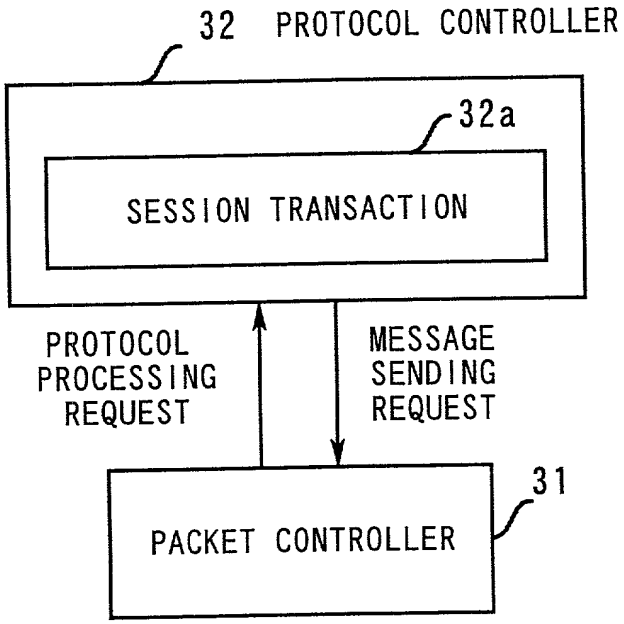
32 PROTOCOL CONTROLLER
32a
SESSION TRANSACTION
PROTOCOL PROCESSING REQUEST
MESSAGE SENDING REQUEST
31
PACKET CONTROLLER

FIG. 28

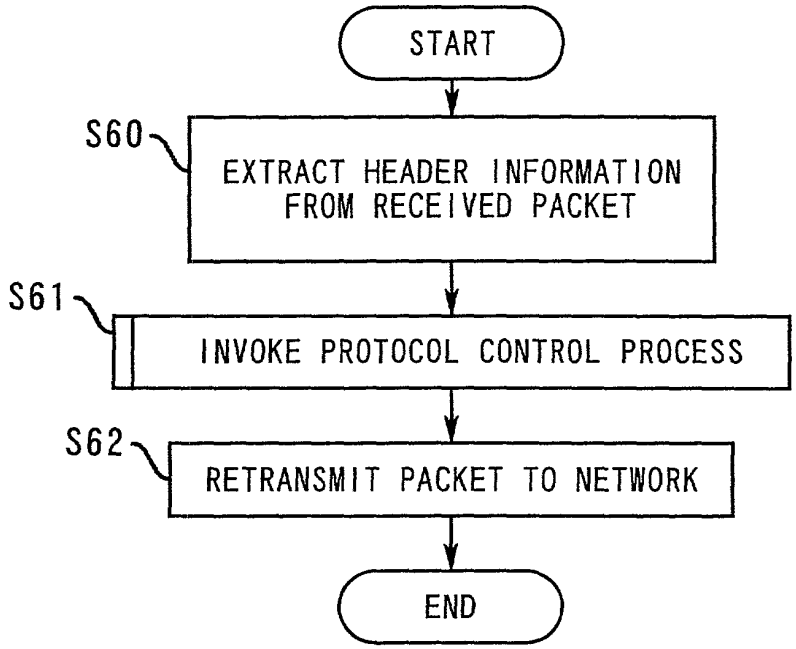
START
S60
EXTRACT HEADER INFORMATION FROM RECEIVED PACKET
S61
INVOKE PROTOCOL CONTROL PROCESS
S62
RETRANSMIT PACKET TO NETWORK
END

FIG. 29

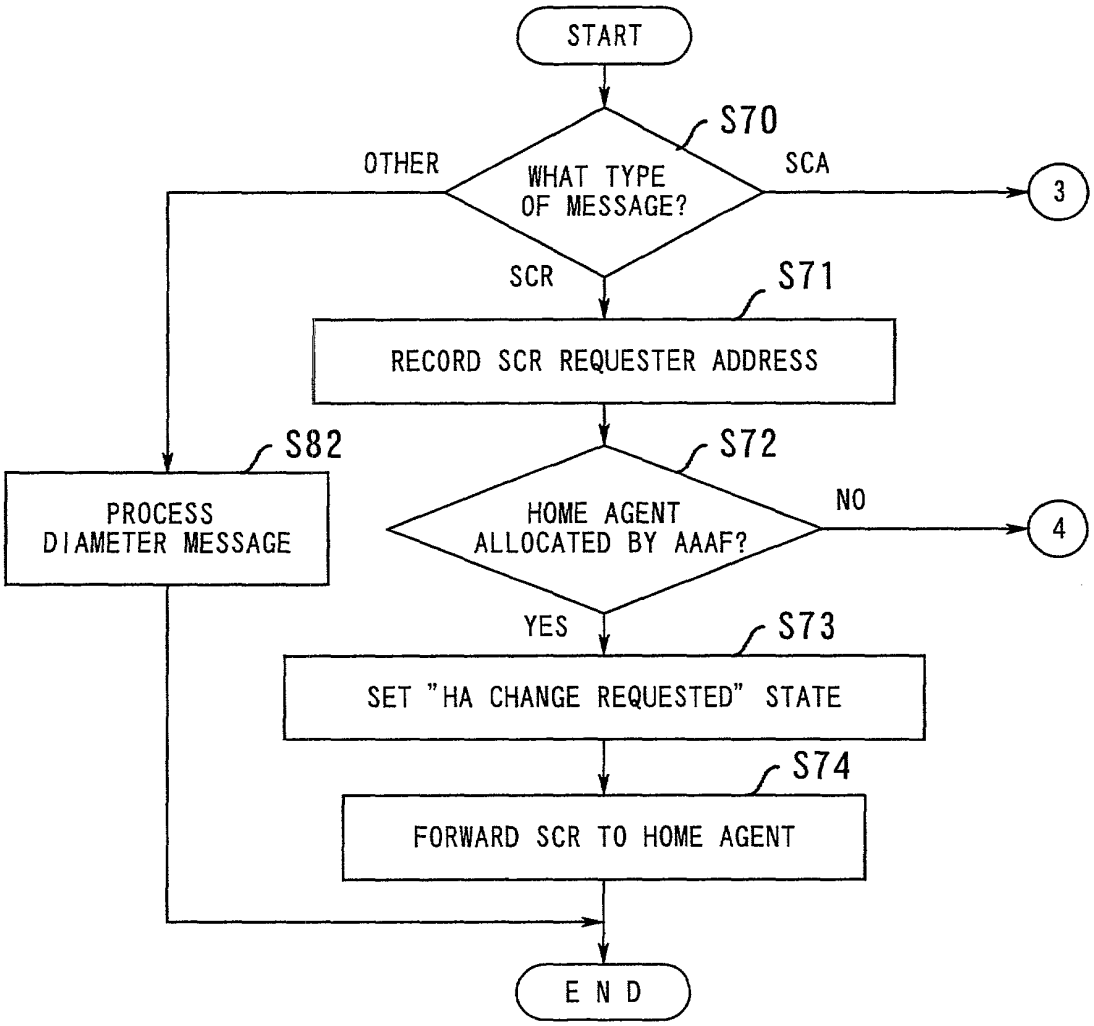
START
S70
WHAT TYPE OF MESSAGE?
OTHER
SCA
3
SCR
S71
RECORD SCR REQUESTER ADDRESS
S72
HOME AGENT ALLOCATED BY AAAF?
NO
4
YES
S73
SET "HA CHANGE REQUESTED" STATE
S74
FORWARD SCR TO HOME AGENT
S82
PROCESS DIAMETER MESSAGE
END

FIG. 30

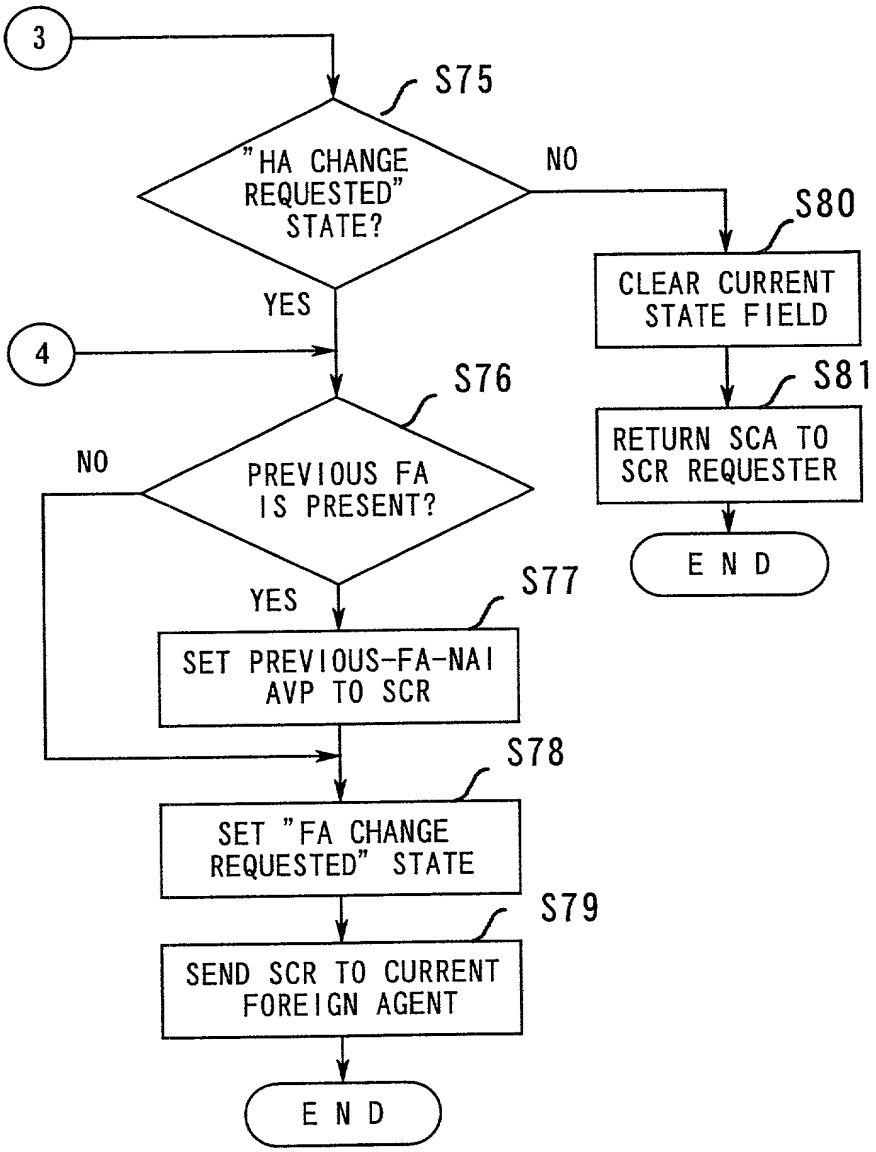
3
S75
"HA CHANGE REQUESTED" STATE?
NO
S80
CLEAR CURRENT STATE FIELD
YES
4
S76
S81
RETURN SCA TO SCR REQUESTER
NO
PREVIOUS FA IS PRESENT?
E N D
YES
S77
SET PREVIOUS-FA-NAI AVP TO SCR
S78
SET "FA CHANGE REQUESTED" STATE
S79
SEND SCR TO CURRENT FOREIGN AGENT
E N D

FIG. 31

620

Message Received	Action to be Invoked	Criteria	Destination	Message to Send
AMR	Create session transaction	with Previous-FA-NAI AVP	AAAH	AMR
		w/o Previous-FA-NAI AVP	Current Foreign Agent	AMA
AMA	Set service profile to session transaction	w/o Home-Agent-Address AVP	Home Agent	HAR
		with Home-Agent-Address AVP	Current Foreign Agent	AMA
HAA	Set home agent address to session transaction		Current Foreign Agent	AMR
SCR	Update service profile	w/o Home Agent allocation	Current Foreign Agent	SCR
		with Home Agent allocation	Home Agent	SCR
SCA	Forward SCA message	in "HA Change Requested" state	Current Foreign Agent	SCR
		in "FA Change Requested" state	AAAH	SCA
SFR	Forward SFR message	w/o Home Agent allocation	Current Foreign Agent	SFR
		with Home Agent allocation	Home Agent	SFR
SFA	Terminate session transaction	in "HA Release Requested" state	Current Foreign Agent	SFR
		in "FA Release Requested" state	AAAH	SFA

FIG. 32

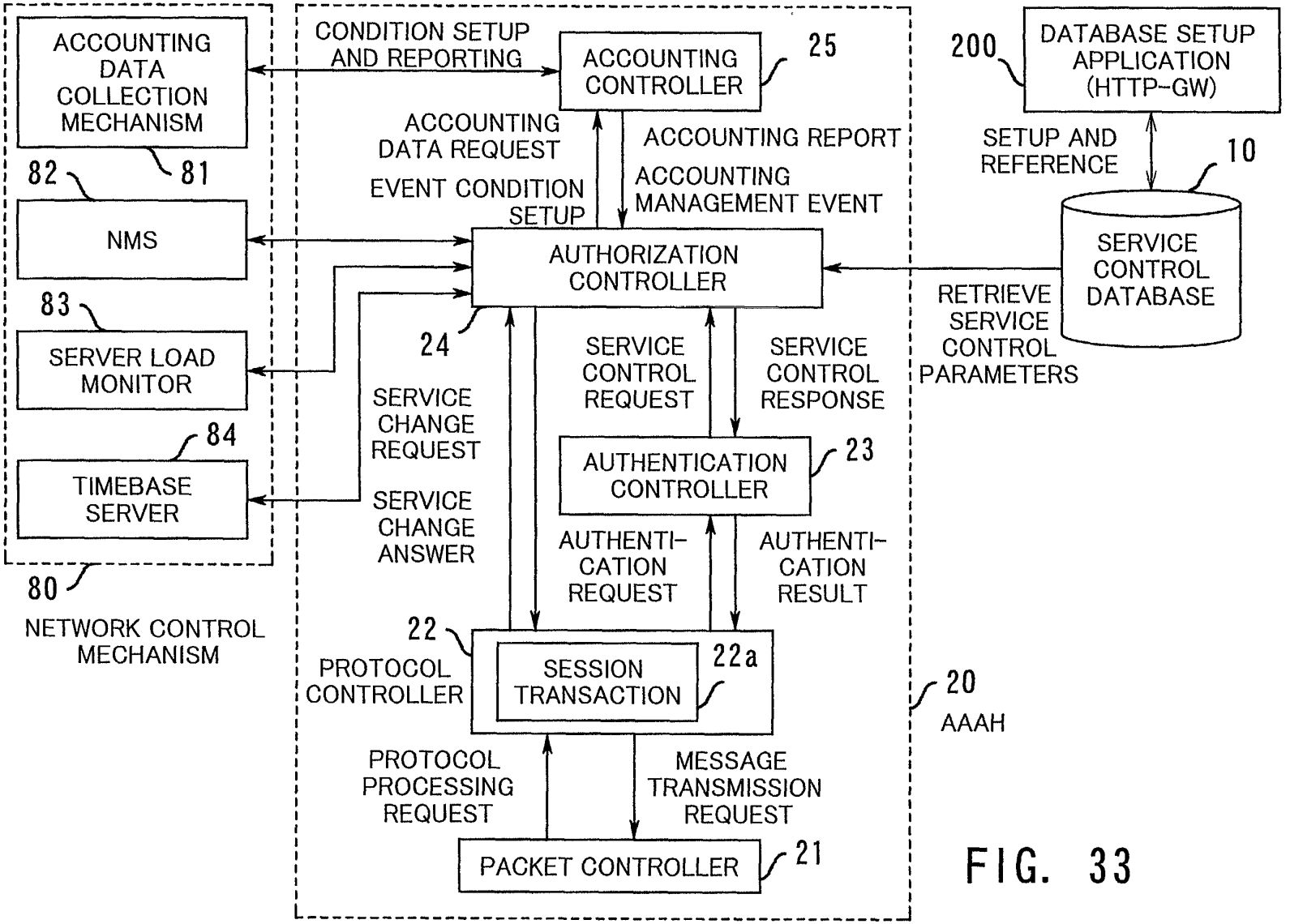

FIG. 33

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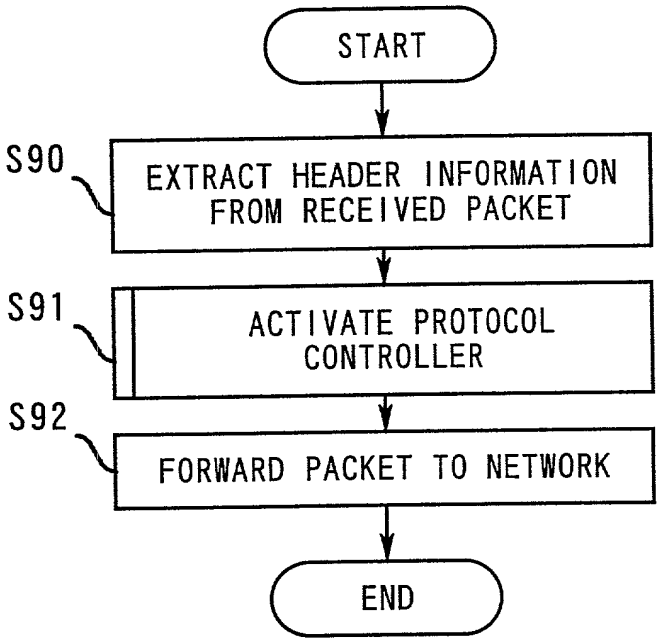
START
S90
EXTRACT HEADER INFORMATION FROM RECEIVED PACKET
S91
ACTIVATE PROTOCOL CONTROLLER
S92
FORWARD PACKET TO NETWORK
END

FIG. 34

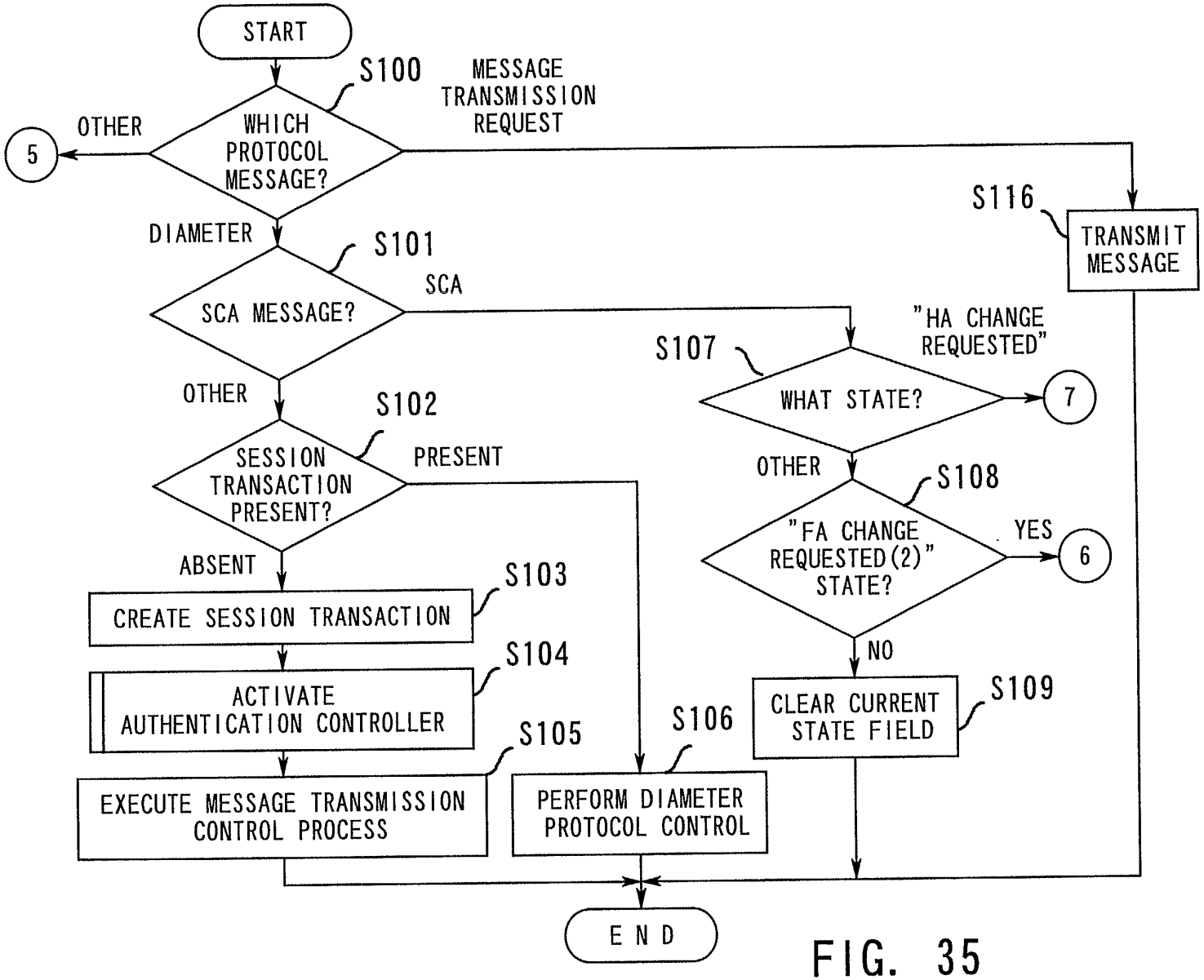

FIG. 35

09759183.011201

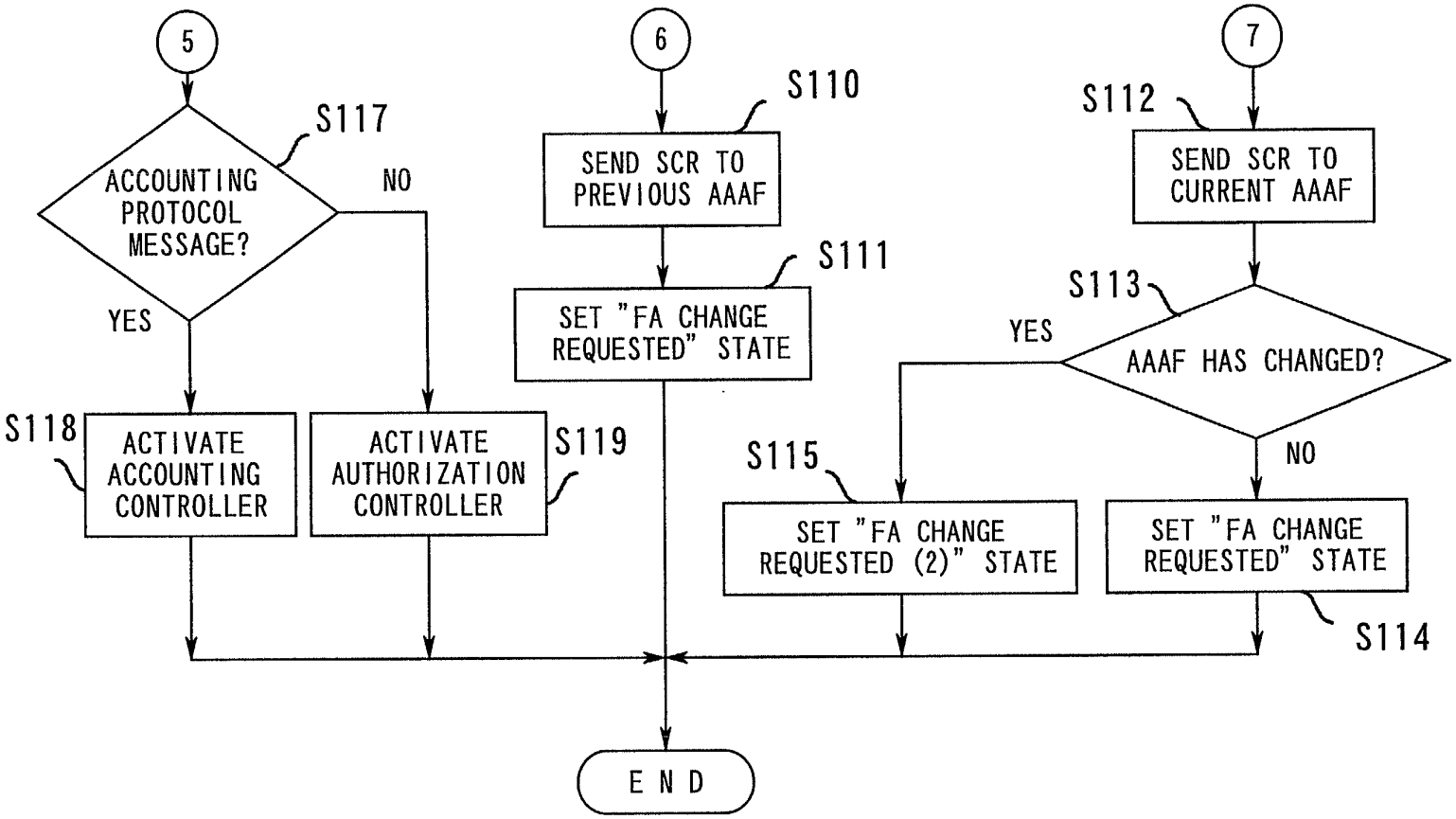
5
6
7
S117
ACCOUNTING PROTOCOL MESSAGE?
NO
YES
S110
SEND SCR TO PREVIOUS AAAF
S111
SET "FA CHANGE REQUESTED" STATE
S112
SEND SCR TO CURRENT AAAF
S113
AAAF HAS CHANGED?
YES
NO
S118
ACTIVATE ACCOUNTING CONTROLLER
S119
ACTIVATE AUTHORIZATION CONTROLLER
S115
SET "FA CHANGE REQUESTED (2)" STATE
SET "FA CHANGE REQUESTED" STATE
S114
END

FIG. 36

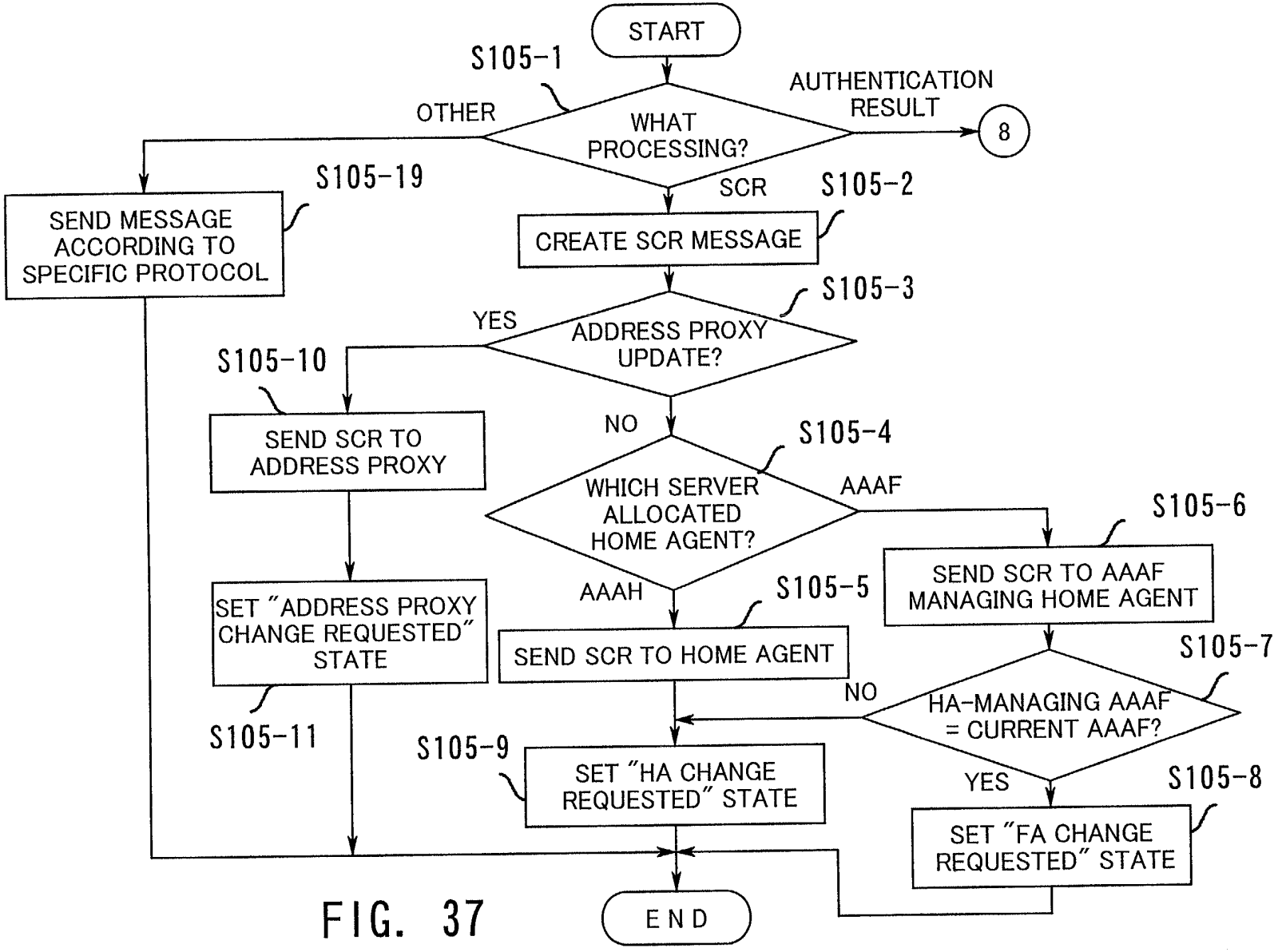

FIG. 37

09759183_011201

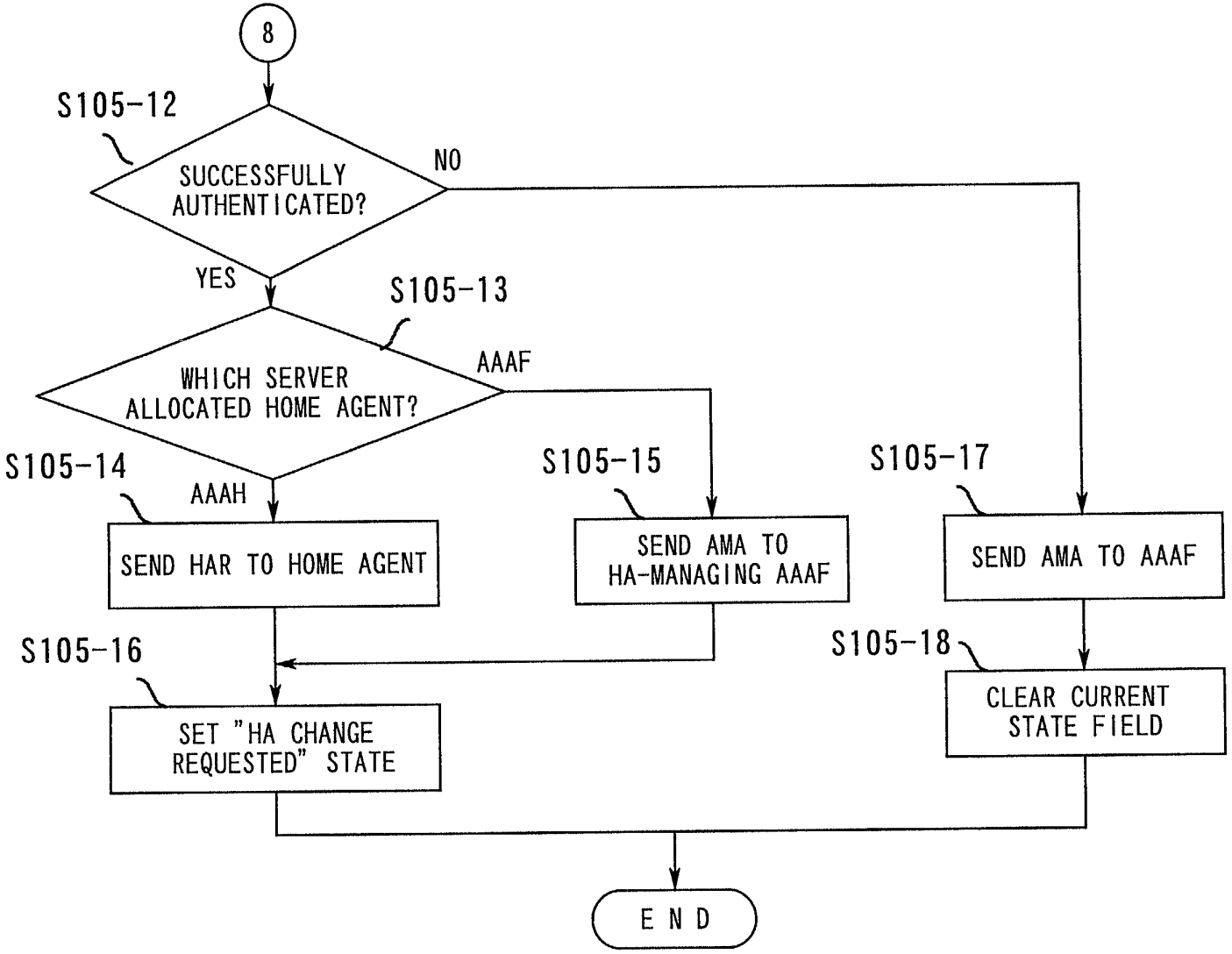

FIG. 38

09759183.011201

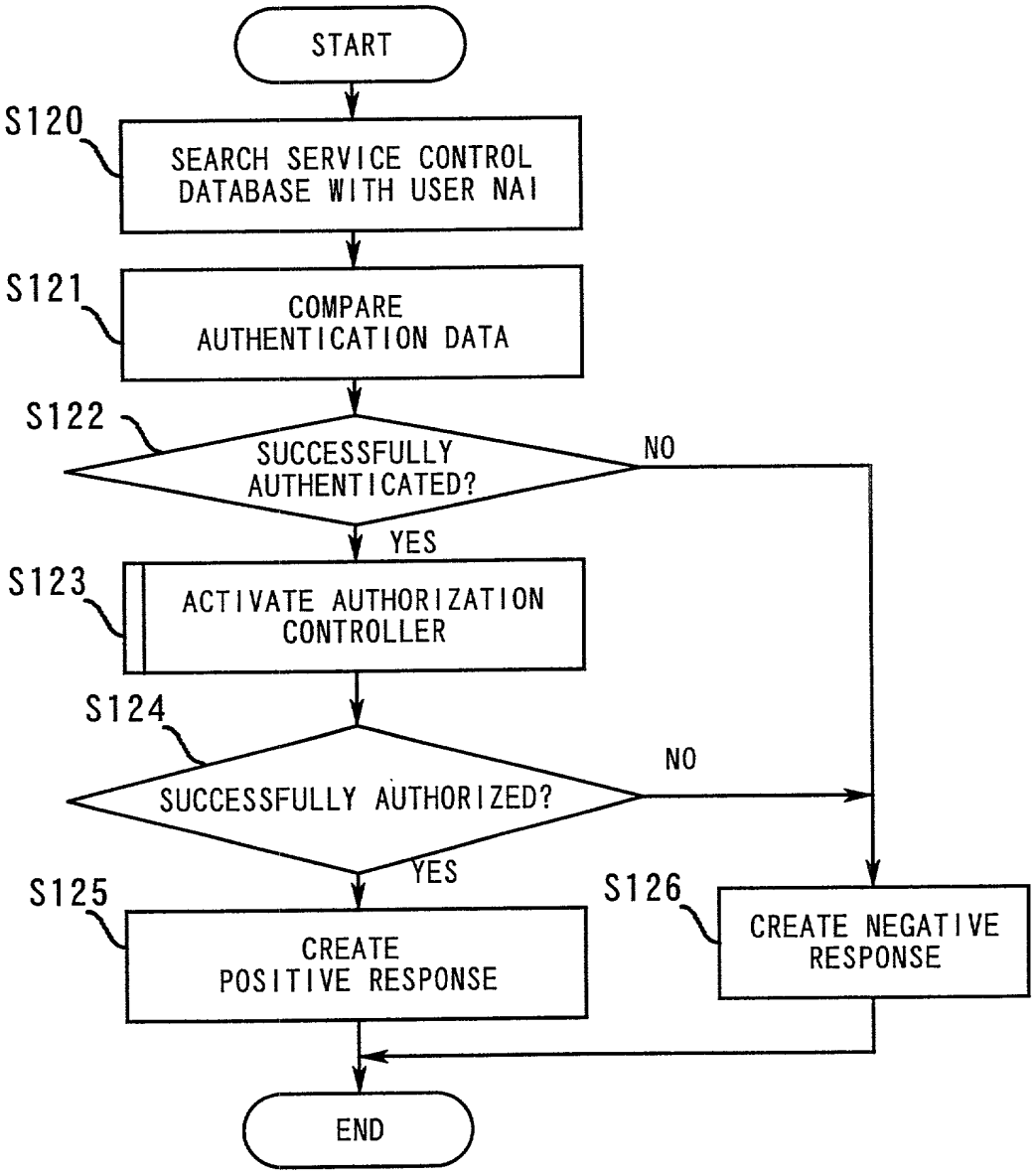
START
S120
SEARCH SERVICE CONTROL DATABASE WITH USER NAI
S121
COMPARE AUTHENTICATION DATA
S122
SUCCESSFULLY AUTHENTICATED?
NO
YES
S123
ACTIVATE AUTHORIZATION CONTROLLER
S124
SUCCESSFULLY AUTHORIZED?
NO
YES
S125
CREATE POSITIVE RESPONSE
S126
CREATE NEGATIVE RESPONSE
END

FIG. 39

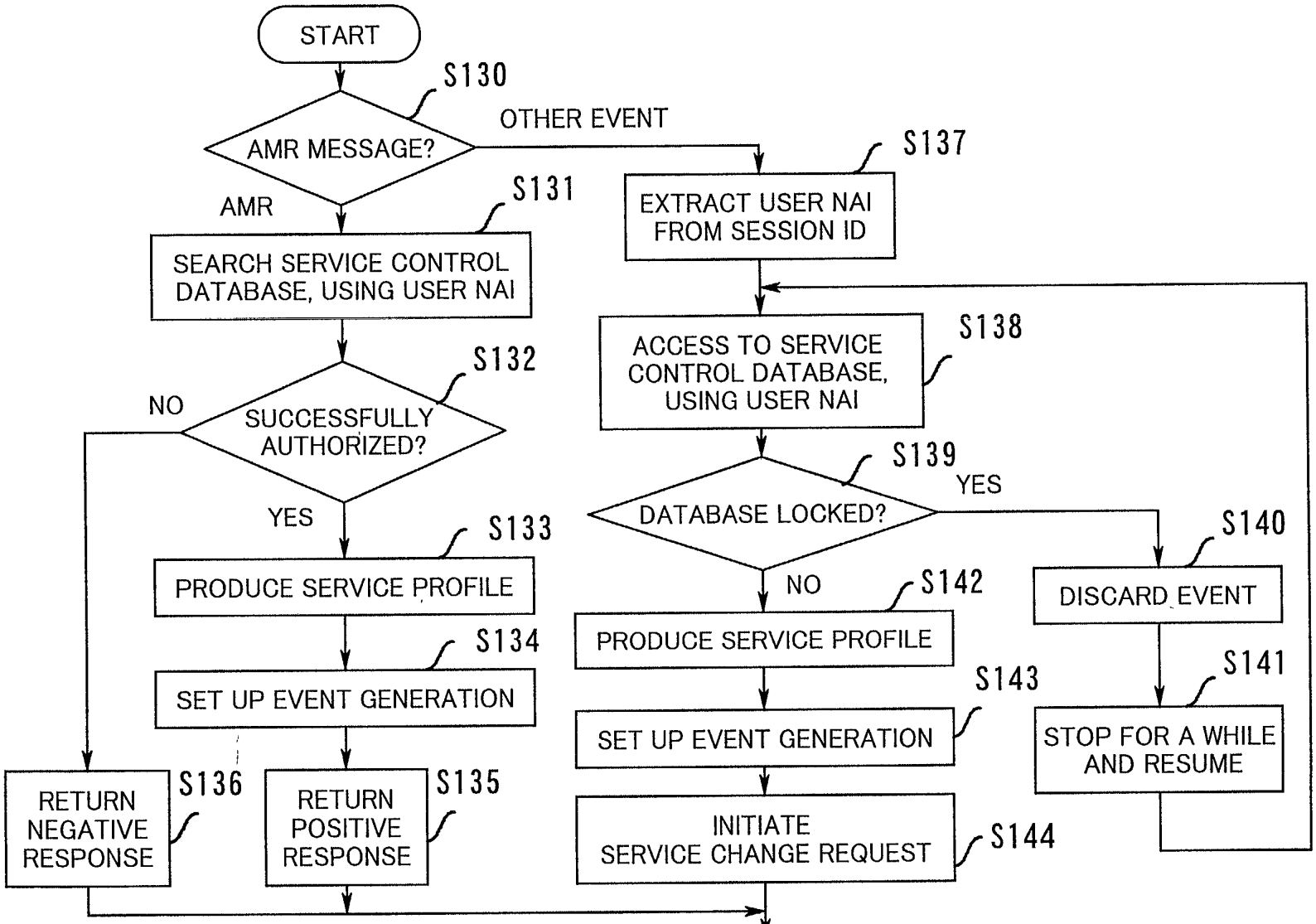

FIG. 40

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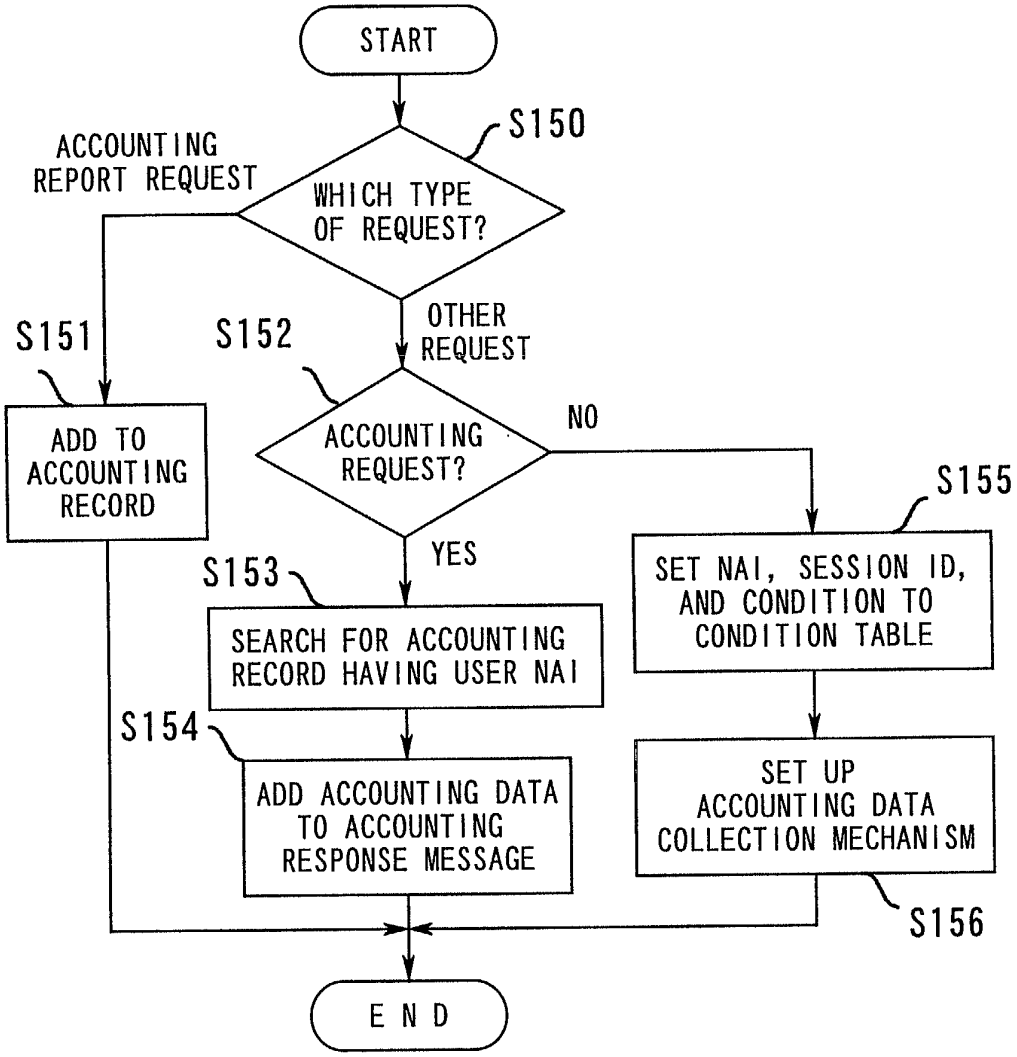

FIG. 41(A)

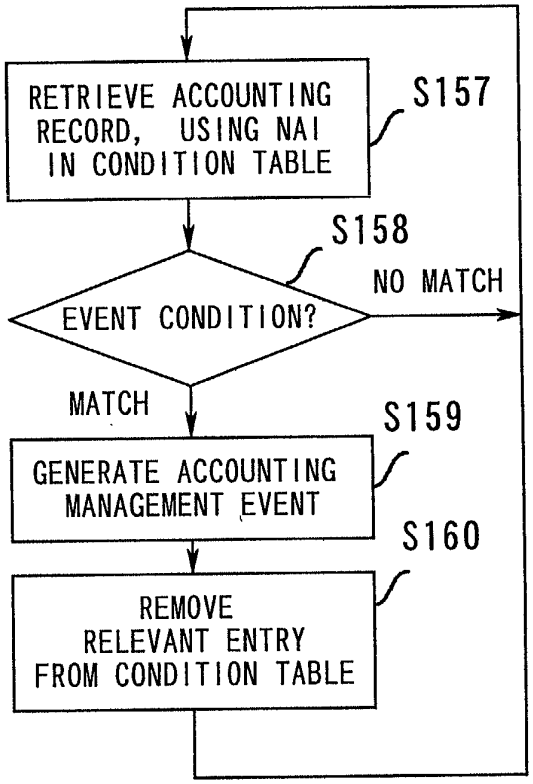

FIG. 41(B)

09759183_011201

700

Message Received	Action to be Invoked	Criteria	Destination	Message to send
AMR	Create session transaction	w/o Home-Agent-Address AVP	Current AAAF	AMA
		with Home-Agent-Address AVP	Home Agent	HAR
		(Mobile node has roamed into different AAAF domain) and (Home agent has been allocated by previous AAAF)	Purevious AAAF	AMR
AMA	Forward AMA message		Current AAAF	AMA
HAA	Set Home Agent address to session transaction		Current AAAF	AMA
SCA	Forward SCA message	in "HA Change Requested" state	Current AAAF	SCR
SFR	Forward SFR message, and terminate session transaction	w/o Home Agent allocation	Requesting entity	SFA
		with Home Agent allocation	Home Agent	SFR
SFA	Terminate session transaction	in "HA Release Requested" state	Current AAAF	SFR

FIG. 42

09759183 .011201

701

NAI	Session ID	Condition
userA@domain1	<userA@domain1><10.11.22.33.><19991029013445>	if $100≧
userB@domain1	<userB@domain1><10.11.22.33.><19991029003445>	if $150≧
:	:	:
userZ@domain1	<userZ@domain1><10.12.23.4><19991029091000>	if $50≧

FIG. 43

09759183.011201

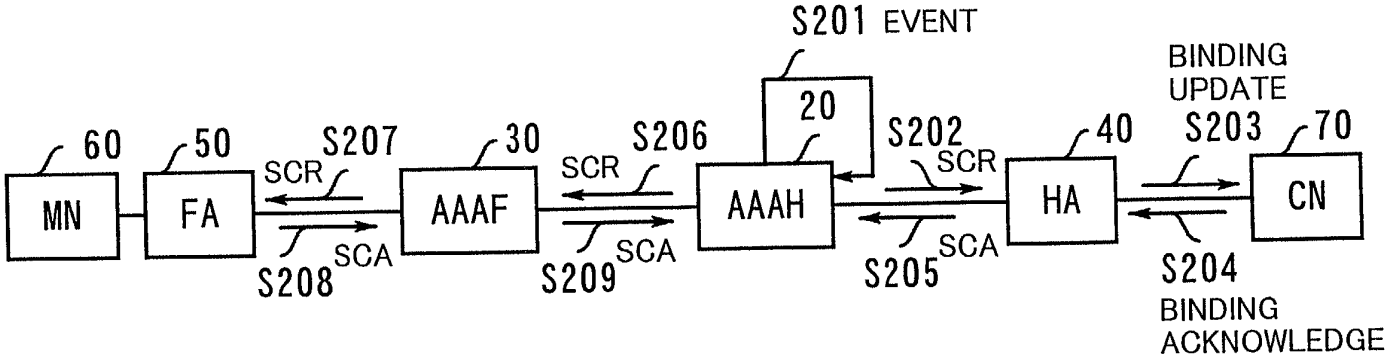
S201 EVENT
20
BINDING
UPDATE
S203
70
60
50
S207
30
S206
S202
40
SCR
SCR
SCR
MN
FA
AAAF
AAAH
HA
CN
S208
SCA
S209
SCA
S205
SCA
S204
BINDING
ACKNOWLEDGE

FIG. 44

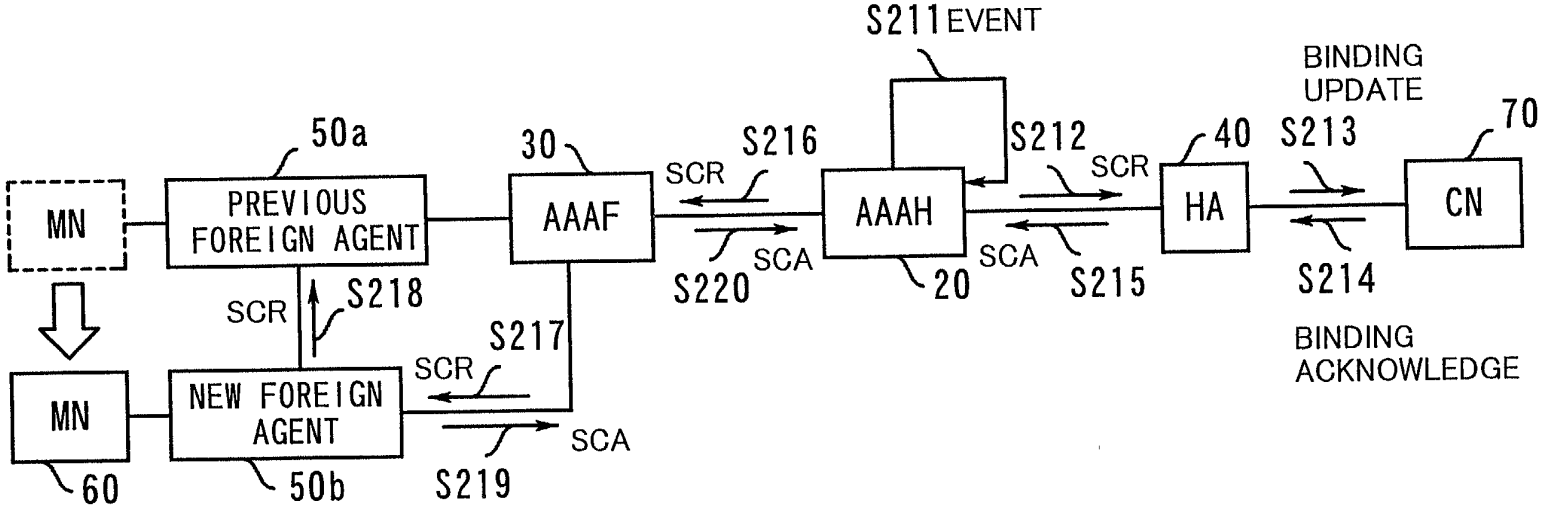
S211 EVENT
BINDING UPDATE
50a
30
S216
S212
40
S213
70
MN
PREVIOUS FOREIGN AGENT
AAAF
SCR
AAAH
SCR
HA
CN
S220
SCA
20
SCA
S215
S214
SCR
S218
S217
BINDING ACKNOWLEDGE
MN
NEW FOREIGN AGENT
SCR
SCA
60
50b
S219

FIG. 45

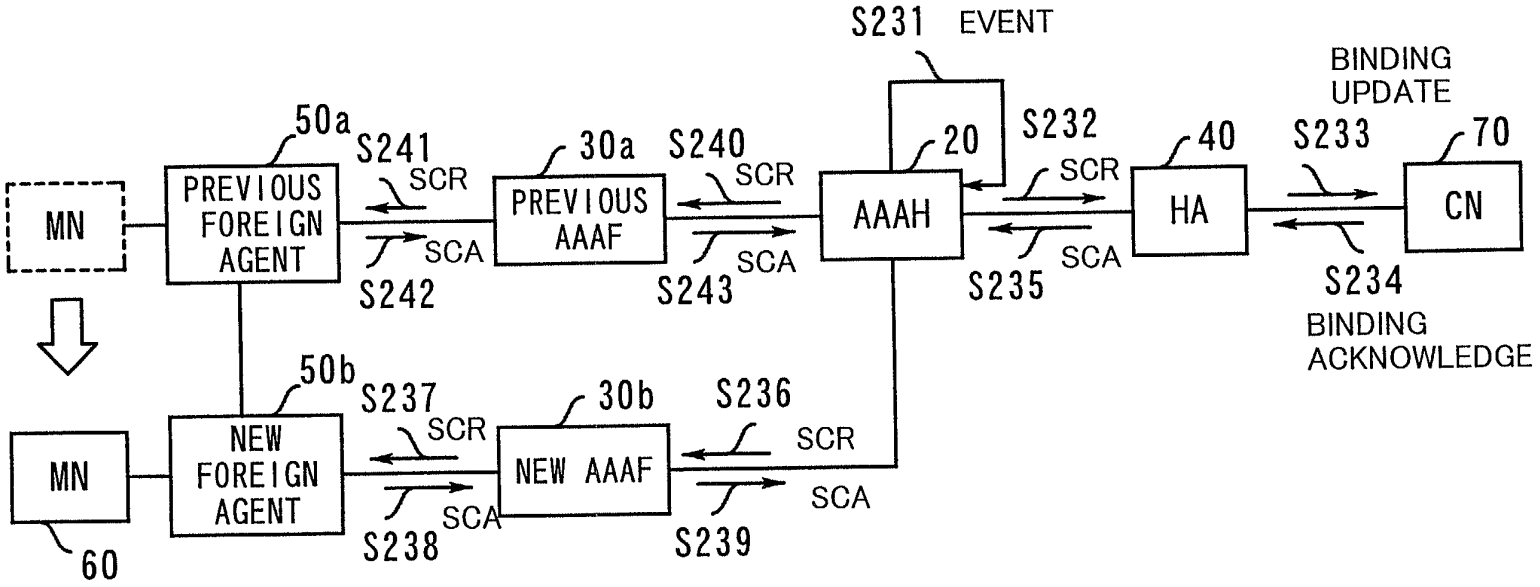
S231
EVENT
BINDING
UPDATE
50a
S241
SCR
30a
S240
SCR
20
S232
SCR
40
S233
70
MN
PREVIOUS
FOREIGN
AGENT
SCA
S242
PREVIOUS
AAAF
SCR
SCA
S243
AAAH
SCA
S235
HA
CN
S234
BINDING
ACKNOWLEDGE
50b
S237
SCR
30b
S236
SCR
MN
NEW
FOREIGN
AGENT
SCA
S238
NEW AAAF
SCA
S239
60

FIG. 46

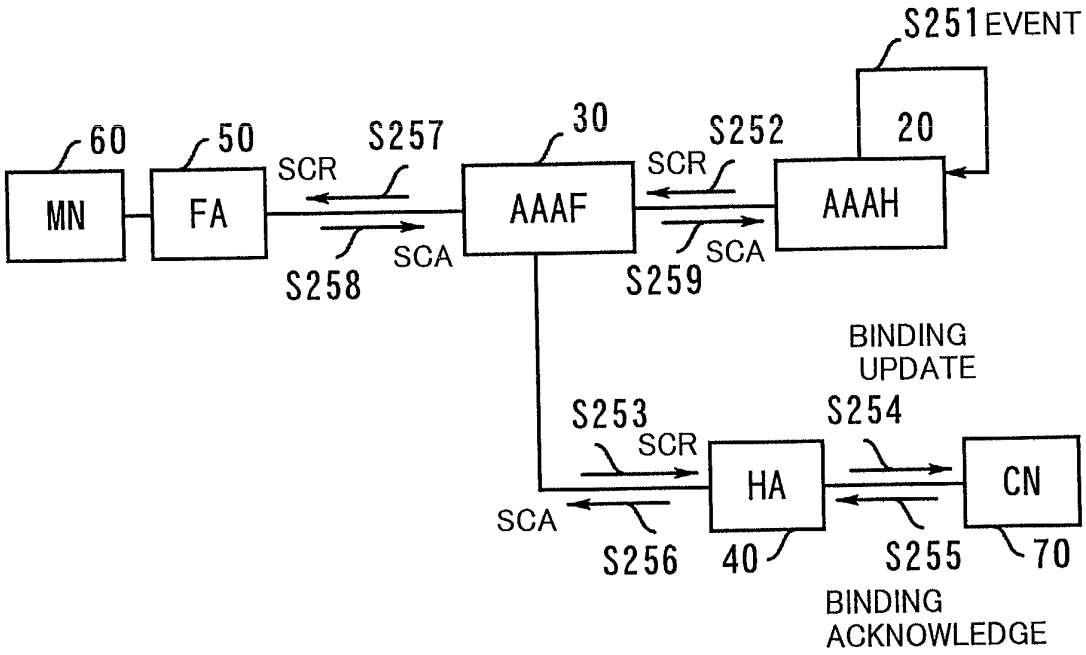
S251 EVENT
20
60
50
S257
30
S252
SCR
SCR
MN
FA
AAAF
AAAH
SCA
SCA
S258
S259
BINDING
UPDATE
S253
S254
SCR
HA
CN
SCA
S256
40
S255
70
BINDING
ACKNOWLEDGE

FIG. 47

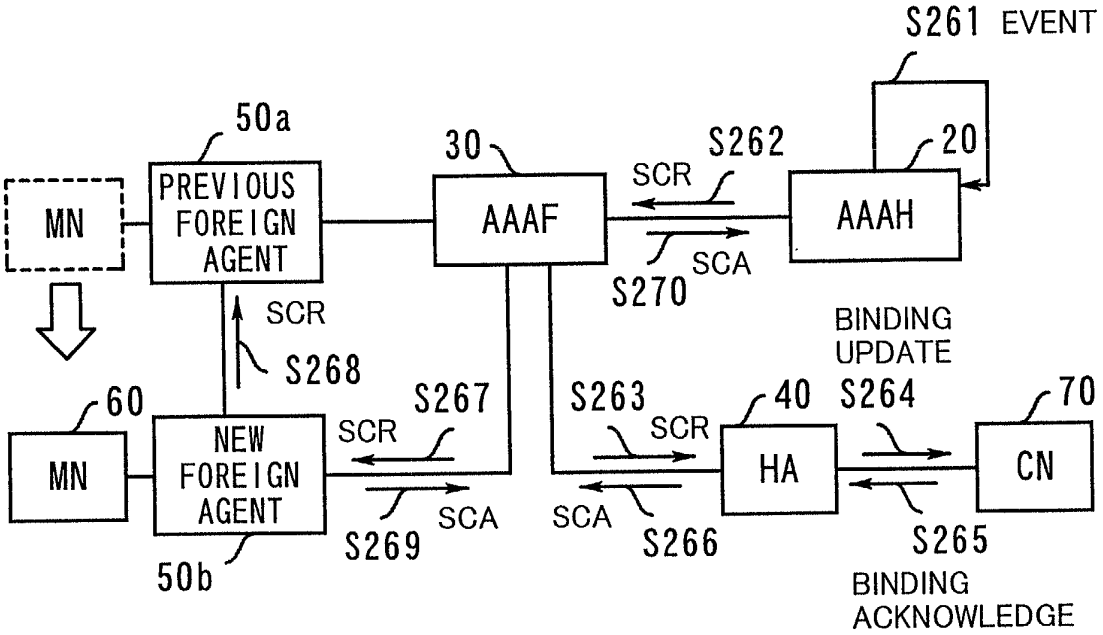

FIG. 48

09759183.011201

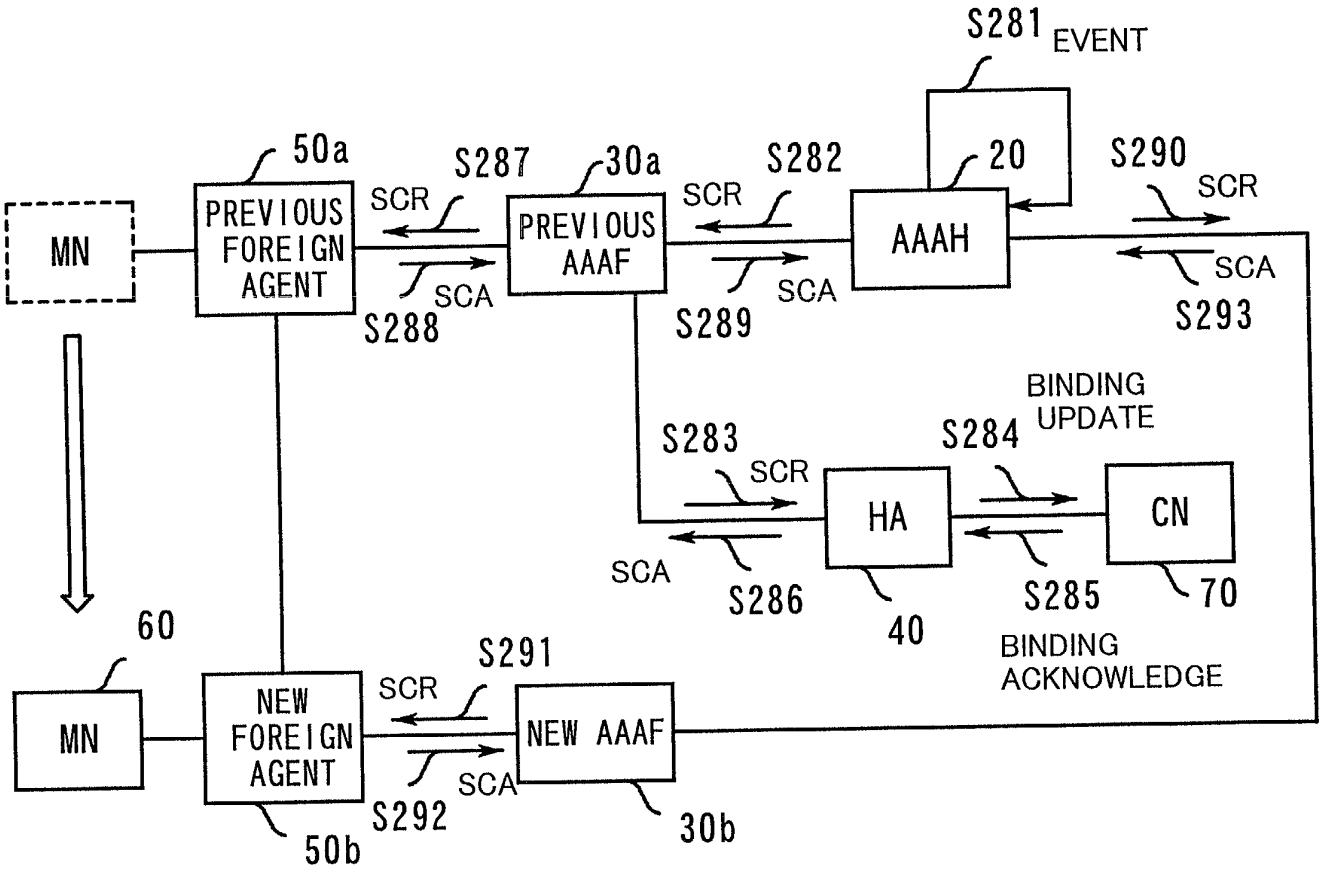

FIG. 49

09750183.011201

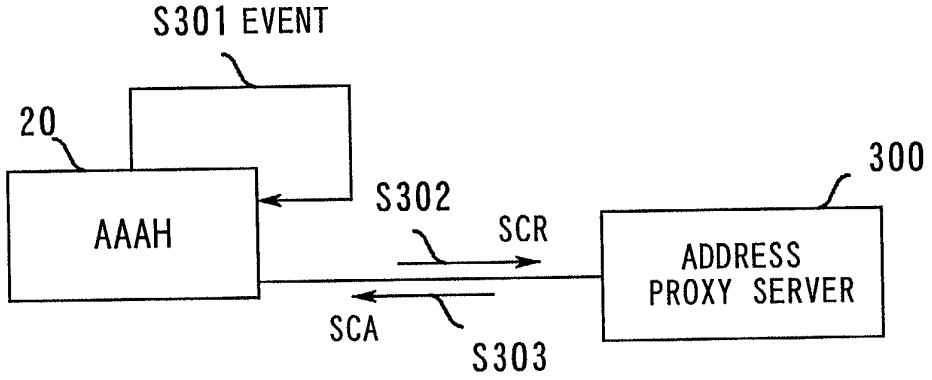

FIG. 50

09750183 .011201

Service Type		Diffserv
Additional Information 1	Diffserv Activation Policy	*
	Service Class	Class C
	Direction	Upstream
	IP Address	*
	Port No.	*
Additional Information 2	Diffserv Activation Policy	Time : 23:00 to 08:00
	Service Class	Class B
	Direction	Downstream
	IP Address	*
	Port No.	*
Additional Information 3	Diffserv Activation Policy	Time : 08:00 to 23:00
	Service Class	Class C
	Direction	Downstream
	IP Address	*
	Port No.	*

FIG. 51

09759183 .011201

Service Type		Diffserv
Additional Parameters 1	Diffserv Activation Policy	*
	Service Class	Class C
	Direction	Upstream
	IP Address	*
	Port No.	*
Additional Parameters 2	Diffserv Activation Policy	*
	Service Class	Class B
	Direction	Downstream
	IP Address	*
	Port No.	*
Additional Parameters 3	Diffserv Activation Policy	Amount of Charges ≧$100
	Service Class	Class C
	Direction	Downstream
	IP Address	*
	Port No.	*

FIG. 52

Service Type		Packet Filtering
Additional Parameters	Filter Activation Policy	(IP Address) AND (Time 08:00 to 21:00)
	IP Address	XXX.XXX.*. *
	Port No.	*

FIG. 53

09759183_011201